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EXATRON 2500

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MODEL 2500
FIVE SORT HANDLER

OPERATIONS MANUAL
FEBRUARY 1984
SECOND EDITION

exatron
automatic test equipment
3513 Ryder Street
Santa Clara, California 95051
407-737-7111 – 800-EXA-TRON
Telex 172090

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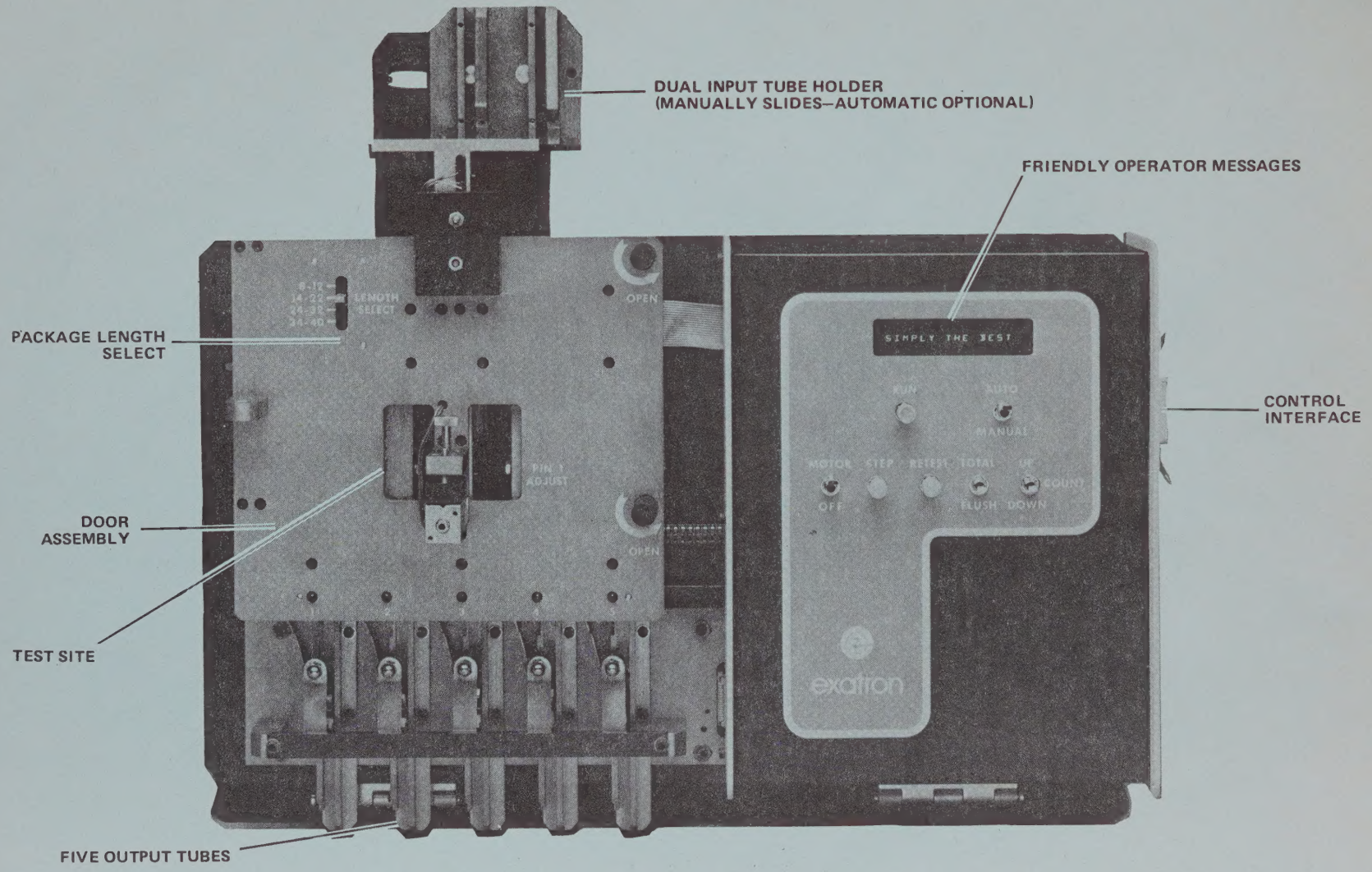


MODEL 2500 – FULL FRONT VIEW, POWER SUPPLY NOT SHOWN

SECTION I

GENERAL INFORMATION

This manual provides the operation, installation, and maintenance information for the Exatron Model 2500 5 Sort Handler. This handler is for Dual-In-Line Packages (DIP) with 8 to 40 leads on centerlines of 0.300" and 0.600". The manual also contains schematics of the electrical system and a spare parts list.

This manual specifically applies to the configuration of the particular machine with which it is supplied. If modifications are made to the machine, the manual pages supplied with the modification kit should be incorporated into the manual to maintain its current status.

GENERAL DESCRIPTION

The Exatron Model 2500 is a tube to tube, continuous throughput 5 sort Dual-In-Line Package (DIP) Handler. It can handle devices as small as 8 pins, 0.300" wide, to as large as 40 pins, 0.600" wide. To convert from one size DIP to the next takes only seconds, with the fewest adjustments of any handler in its class, Universal guide rails and input/output tube holders require no operator adjustments. Sample devices serve as gauge blocxs to eliminate package thickness adjustments, as in all Exatron Handlers.
NOTE: .400" wide devices require a slight change over kit.

Simply select the package length with the four position slide switch, check the pin 1 adjustment, and, if necessary, change the test contactor block to convert the handler from .300" to .600". No other handler can be converted as quickly.

The 2500 is designed to be reliable using long life standard solenoids and a standard off-the-shelf STD Bus computer card. No air lines are required. All solenoids and the stepper motor require low voltage DC power, using no A.C. power. The power supply is packaged separately. The handler operation is constantly monitored by its internal CPU. Once a device enters the handler, it is sensed through every step until it is positively placed in the correct output tube. Should a jam occur, an appropriate error message will be displayed. Almost all jams can be cleared from the front panel without opening the door of the handler.

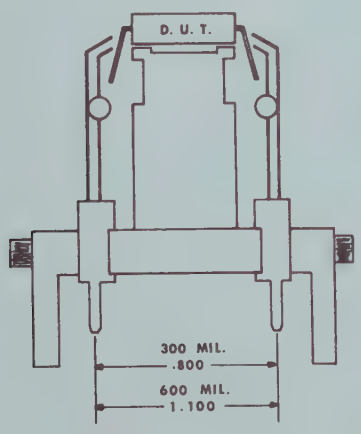
The Handler can operate in two modes, AUTO and MANUAL. MANUAL operation allows single device cycling of the handler. The test contactors can be cycled as many times as desired without releasing the Device Under Test (DUT). AUTO operation will allow continuous operation. The handler will stop when empty but will start automatically as soon as more devices are loaded. No Buttons to Push! Each output tube can be filled to any preset amount, and individual counters keep track of all outputs. In

the event a tube fills, the handler will automatically fill any other unfilled tube. When all tubes are filled the handler will stop and display condition. The tube counter is automatically reset by removing and reinserting an empty tube. No Buttons to Push! The handler will not cycle devices to outputs which have no tubes. Additionally, a total count is maintained for each output, up to a total of 999,999 devices.

The distance from the input tube to the output tube is less than 10". Short travel means less jams. Sorting is accomplished by use of a stepper motor and a solenoid blocked shuttle. Sensors keep track of the shuttle's position at all times. In the event of a problem, a message will be displayed and the device will not be binned until the problem is corrected.

CONTACT METHOD

The handler makes contact to the Device Under Test (D.U.T.) by use of opposing pairs of true Kelvin/bifurcated contactors. They are mounted in a block which must be changed to convert from 0.300" to 0.600". Contact is made on the shoulder of the device. There is no need to "fine tune" the height of the contacts relative to the thickness of the part. The contacts are available from multiple sources. They can be made from goldplated berillium copper or solid precious metal. The contacts are available individually or in sets.



CONTACT METHOD

TEST SEQUENCE – CONVENTIONAL

Prior to the handler issuing a start signal to the tester, verification is required that the following conditions exist;

A.) There is a part in the test head.
B.) The contacts are closed onto the Device Under Test.
C.) There are no devices further along in the handler.
D.) The shuttle is in the proper home location.
E.) The output tubes are not filled.

When verification is received the handler will issue the start signal to the tester. The handler will accept up to 8 SORT signals. An internal DIP plug programs the handler to the proper output BIN. The part is then positively binned and a new cycle is initiated.

TEST SEQUENCE – RS-232

The handler will perform the same verifications prior to the beginning of test as a conventional interface. The following are additional checks which must be verified prior to beginning of test.

F.) RS-232 interface cable is installed on the handler's control port connector.

G.) The handler will then issue a no operation command to verify that the tester/programmer is on line and communicating with the handler.

When verification is received the handler will issue ASCII commands to the tester/programmer. The exact sequence of commands varies. Consult Exatron for an exact definition of how your particular interface operates.

SPARE PARTS KIT (See Section VIII for Contents)

The spare parts kit for the handler includes samples of all nuts, bolts, washers, spare set of ICs, switches, LEDs, solenoids, motors, and other parts that have been found to cause field problems. In general, the kit will decrease the downtime. During warranty of the handler, any part that fails and is returned to Exatron will be replaced at no charge.

All kits are organized into sturdy, metal tool boxes and are clearly labeled as Exatron spare parts. This inventory includes the quanity of each part, the exact (generic) part number, the manufacturer's name, and the location of the part within the kit. Should an empty compartment occur within the kit, you can easily replace the part directly from Exatron or from any other component source.

WARRANTY

The Model 2500 5 Sort Handler is under warranty for one year.

Exatron agrees to repair any mechanical or electrical assembly, subassembly, or an entire unit which fails during normal use. The customer agrees to follow the recommended maintenance procedure which is stated in the manual. Upon failure of unit, contact your local Exatron Sales Representative. In the event the problem cannot be quickly solved, for most cases, a new unit will be loaned to the customer while the problem is being serviced at Exatron. The customer must return the equipment prepaid to Exatron and Exatron will pay the shipping charge back to the customer during the warranty period. Returned equipment will be serviced within 2 working days. Warranty does not include the test contacts. Further, Exatron agrees to service the handler only. All interface cabling, hardware, or harnesses are not warrantied unless supplied by Exatron.

NOTE: If the handler is interfaced to Exatron test equipment, then the entire system is under full warranty, including the interface.

SERVICE OR WARRANTY REPAIR

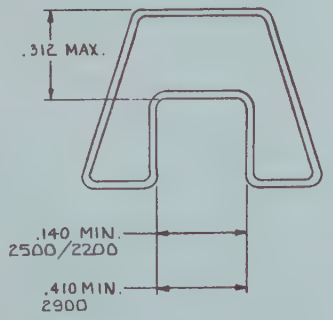
If repair of your handler should become necessary, please have the following information ready to give to Exatron Service:

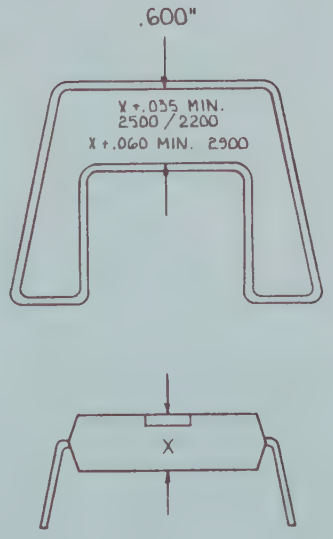
1. Model Number
2. Serial Number
3. Symptoms of the problem
4. Exact wording of any displayed messages.

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

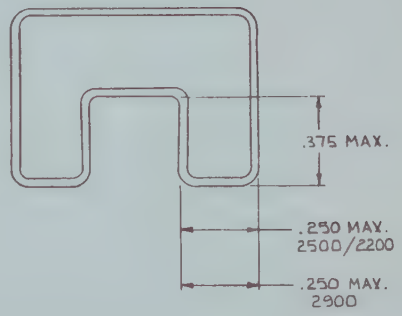
2/84

"A" FRAME TUBE



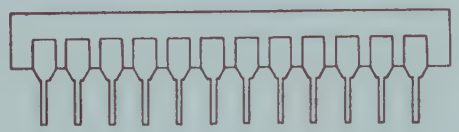


SQUARE TUBE



TUBE MATERIAL:
METAL
PLASTIC (CLEAR OR OPAQUE)

NOTE: TUBES WHICH FALL WITHIN THESE DIMENSIONAL GUIDELINES FIT THE HANDLERS INPUT/OUTPUT TUBE HOLDERS WITHOUT ADJUSTING FOR WIDTH/HEIGHTH/OR "A" FRAME OR SQUARE TUBES.



NOTE: IF TUBES USE PUSH PINS AS MEANS OF PLUGGING TUBES, A BURR MAY OCCUR ON THE INSIDE OF THE TUBE UPON REMOVING OR REPLACING PUSH PIN. THESE BURRS MAY OR MAY NOT CAUSE THE HANDLER TO JAM IN THE OUTPUT OR INPUT TUBE. THE HANDLER HAS NO WAY TO CONTROL THIS BURR, SO EXATRON CAN NOT ASSUME RESPONSIBILITY FOR THIS TYPE OF JAM.

RECOMMENDATION: USE TUBES WITH RUBBER CORKS WHICH DO NOT DAMAGE TUBE WHEN EVER POSSIBLE.

1-5

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± .005 2 PLC DEC ± .01 INTERPRET THIS DWG PER USA STANDARDS	SIGNATURE AND DATE DRAWN JSLOTT 7-22-83 DRFTG CHK DESIGN CHK PROJ MNGR APVD	exatron	
NEXT ASSY	USED ON	MAT'L	FINISH	TITLE	TUBE SPECIFICATIONS
APPLICATION		P/L		SIZE C	DRAWING NO 250 107
				SCALE	SHEET

SECTION II

INITIAL INSTALLATION

LOCATION

ALL SERIES 2000 HANDLERS MUST BE BOLTED SECURELY TO THE TOP OF THE BENCH. The center of gravity of the handler is high in relation to the bench top. This makes the handler unstable and could result in the handler being knocked over. This would cause serious damage to the handler and perhaps to the operator as well.

This machine should be located in a dust free environment to preclude dust and dirt particles from contaminating the moving parts, especially those parts which come in contact with the devices being tested.

The handler should be placed as close as possible to the tester test socket since cable length from the contactor to the tester is critical in most applications. See interface section of this manual for details.

INTERFACING

Bench Top Testers/Programmers

The Model 2500 can be interfaced to any benchtop tester. We supply a simple, well documented interface kit designed to plug directly into a Textool socket. The kit adapts to an assortment of socket sizes. The length of cable varies, but the handler design allows the shortest possible cable lengths. Cables less than 4" in length are typical. The handler control uses a standard 24 pin connector. The timing and pin out are compatible with interfaces available from most tester/ programmer manufacturers.

Large Test Heads

Due to the handler's small size, the handler can be adapted to most large test heads. There are no mechanical portions of the handler which protrude higher than the beginning of the test contactor base. The back of the handler is flat. All handler adjustments can be made from the front of the handler.
*Custom brackets and stands are available for test heads mounted on manipulators.

TILT MECHANISM

Built into every handler is a tilt mechanism. The slide angle may be adjusted from 12 to 60 off of vertical. The tilt mechanism is easily removed for large test head interfaces.

The slide angle needs to be adjusted when large ceramic devices are to be tested. The device may chip or crack upon impact with other devices. Decreasing the angle increases drag and slows down the devices to minimize chipping. Depending upon the mass and shape of the ceramic device, the angle may or may not have to be adjusted. The handler cycle timing is sensor controlled so the cycle speed will automatically be slowed to match that of the devices. The

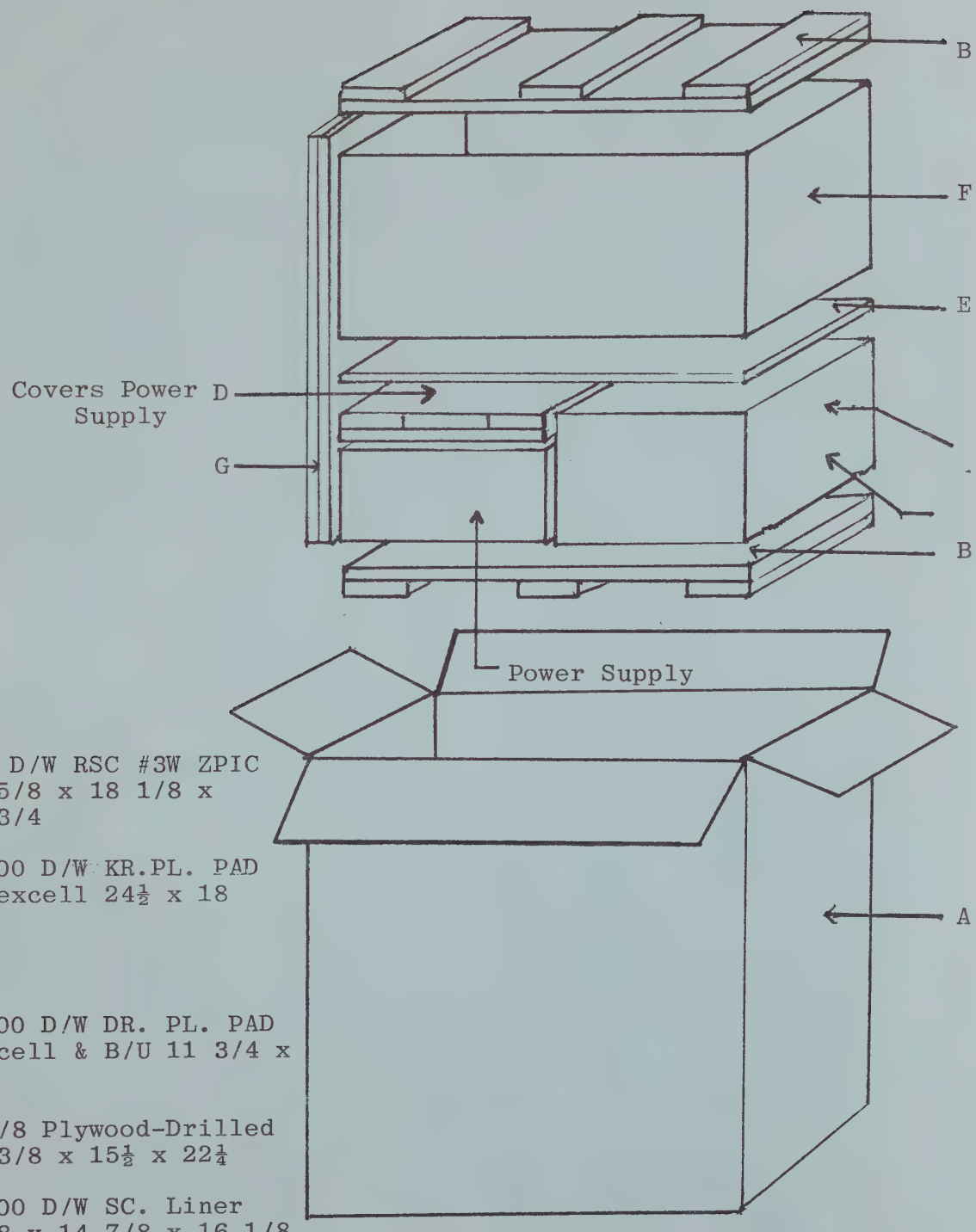
recommended angle for all plastic devices is 12 from vertical.

NOTE: Ceramic packages damage can be minimized by use of bumpers which attach directly on to each device. Some types of bumpers will run thru a standard handler. Custom rails can be easily changed if required.

SHIPPING CARTON

If it should become necessary to return the handler and/or Hot Rail to Exatron for repair, the original carton should be used. Exatron assumes no responsibility for damage caused by improper packing of handler. In the event the carton is lost or severely damaged, new packing cartons can be ordered from Exatron.

2500 Package Assembly



A 1-275 D/W RSC #3W ZPIC 24 5/8 x 18 1/8 x 26 3/4

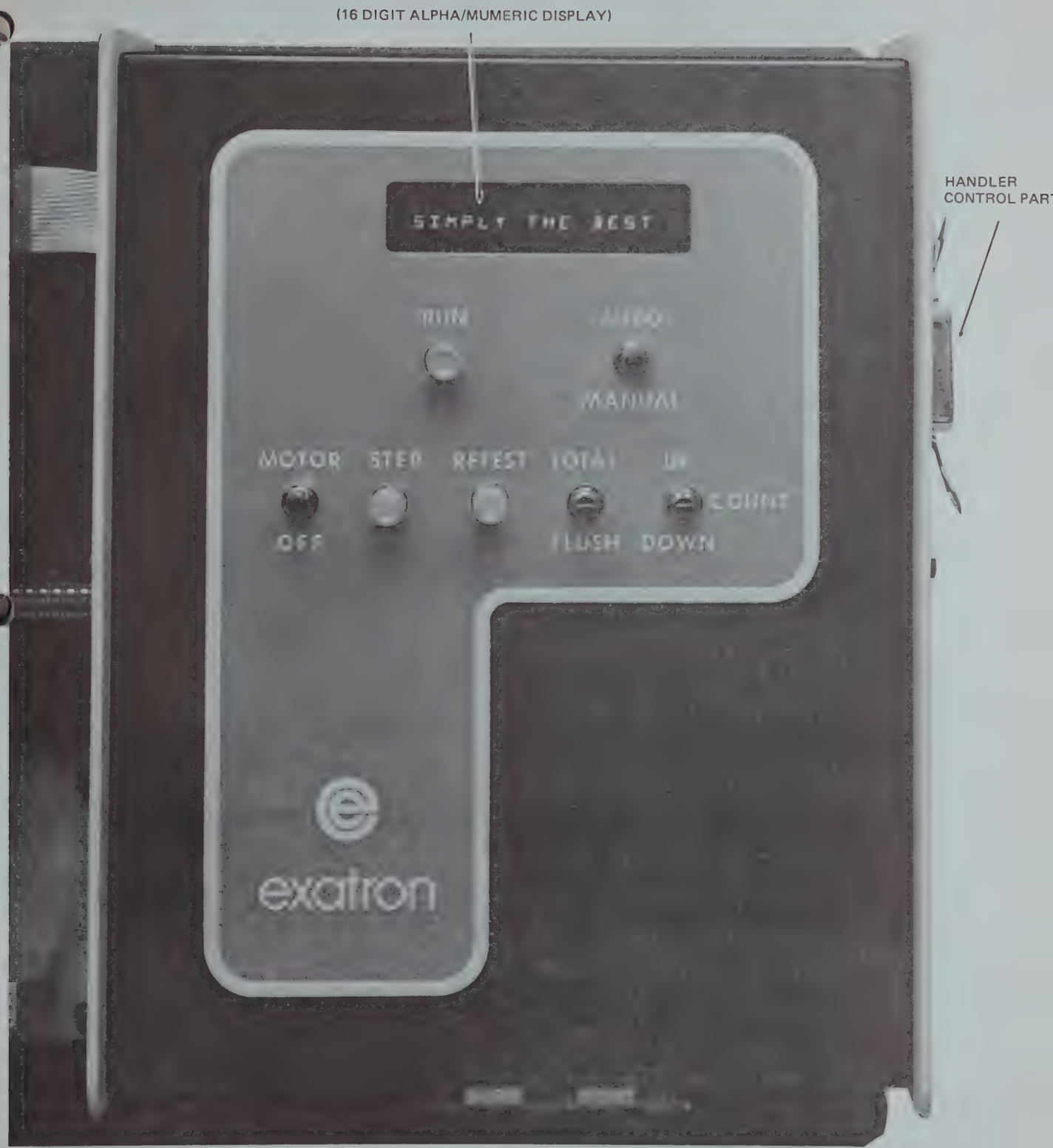
B w/2-200 D/W KR.PL. PAD w/Hexcell 24½ x 18

D w/1-200 D/W DR. PL. PAD w/Hexcell & B/U 11 3/4 x 15½

E w/1-3/8 Plywood-Drilled Base 3/8 x 15½ x 22¼

F w/1-200 D/W SC. Liner 21 3/8 x 14 7/8 x 16 1/8

w/2-200 D/W SC. PAD w/ Hexcell 24¼ x 37 7/8



FRONT PANEL CLOSE UP

SECTION III

INTERFACE INFORMATION

GENERAL INFORMATION

Before attempting an interface on your own, contact Exatron for advice. One phone call could save you many hours of needless grief.

The Model 2500 can be interfaced to virtually any piece of test equipment. All I.C. Testers, PROM Programmers, personal computers, and home made "black boxes" can be automated. You may have many more applications for this handler.

Every interface consists of two main parts, Control and Test Head. The Control Interface is where the handler and tester exchange Start Test and Sorting commands. The Test Head Interface connects the handlers test contacts to the testers test socket.

Most Testers come equipped with a Handler Control Connector. Check to see if your tester is so equipped. Also verify that the connector is functional. Your tester may have an "optional" interface which was never ordered, all Exatron interface kits assume the tester to be functional.

Most PROM Programmers and personal computers do NOT have any Handler Control Connectors. Exatron supplies an RS-232 type interface which overcomes this problem. Since the command sets vary, a different software package may be required.

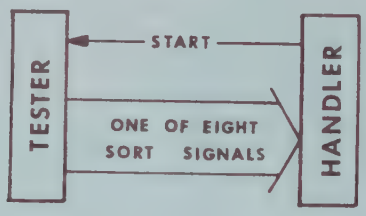
Some tester manufacturers may require your handler to be sent to them for interface. Just remember this is a very simple handler and Exatron guarantees our interfaces. The tester manufacturers interface is typically expensive, poorly built, non-documented, non-guaranteed and has a long lead time. If there are any interface problems, Exatron will work directly with the tester manufacturer to build a compatible system.

HANDLER CONTROL PORT

The handlers control port is located at the extreme right of the handler. The mating connector for this port is an Amphenol 24 pin "D" type connector, part number 57-30240 or the equivalent. The handlers control port is under computer control. The exact definition of signals in and out of this connector may vary. This gives the handler flexability to be conventional, RS-232, or network interfaced. Your handler may be equipped with any combination of these, each will be discussed. Consult Exatron if your are not sure how your handler is set up.

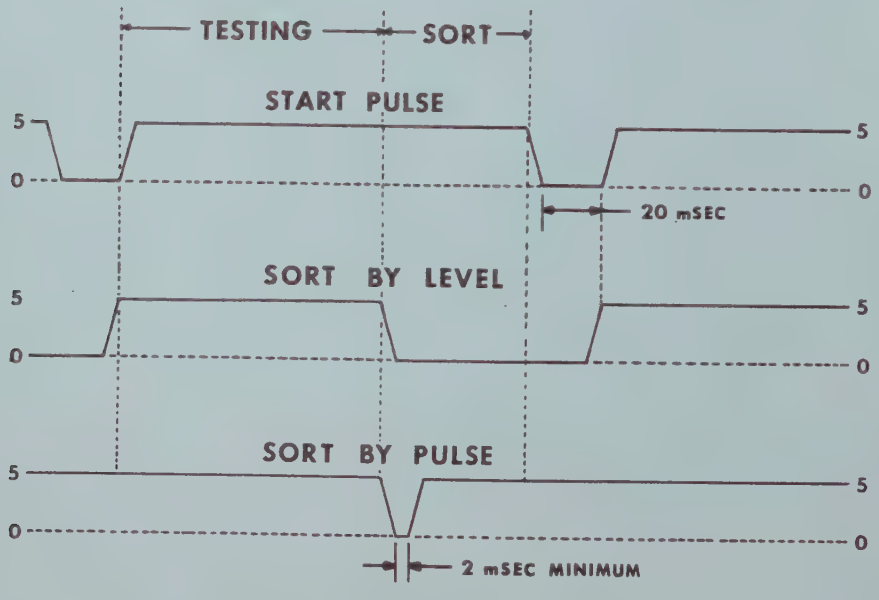
CONVENTIONAL HANDLER CONTROL

The Conventional Control has been set up to match other widely available handlers, this means that most control interfaces are readily available. The following diagram illustrates the basic handler/tester control hand shake.



CONTROL HAND SHAKE

All signals to and from the handler must be TTL compatible, 5 volt logic. The handler supplies 5 volts to the control port, this is intended to power interface circuits only. NEVER TIE THE HANDLERS POWER SUPPLY DIRECTLY TO THE TESTER'S POWER SUPLLY. The following timing diagram shows the relationship of the Start Test and Sort Commands. Note that all signals are normally HI, active LO.



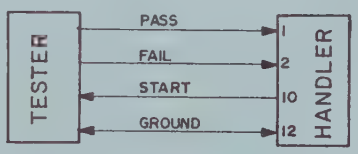
CONTROL TIMING DIAGRAM

CONVENTIONAL HANDLER CONTROL PORT PIN OUT

1	SORT 1	(PASS)	13	GROUND
2	SORT 2	(FAIL)	14	GROUND
3	SORT 3	(HOT RAIL)	15	GROUND
4	SORT 4	(HOT RAIL)	16	GROUND
5	SORT 5	(HOT RAIL)	17	GROUND
6	SORT 6	(HOT RAIL)	18	GROUND
7	SORT 7	(HOT RAIL)	19	GROUND
8	SORT 8	(HOT RAIL)	20	GROUND
9	RESERVED OUTPUT		21	RESERVED OUTPUT
10	START TEST (B.O.T.)		22	RESERVED OUTPUT
11	+5 VOLTS CAUTION		23	+5 VOLTS CAUTION
12	SYSTEM GROUND		24	GROUND

PASS/FAIL APPLICATION

If your handler is to be used for a pass/fail sorting only then we recommend that you connect the pass to pin 1, the fail to pin 2, the start test to pin 10, and ground to pin 12. It is arbitrary which of the eight sort pins are used. By using these pins you will be compatible with all of the handler options and Exatron supplied interface cables.



PASS - FAIL INTERFACE
TYPICALY ONLY 4 WIRES
AS PER TIMING DIAGRAM

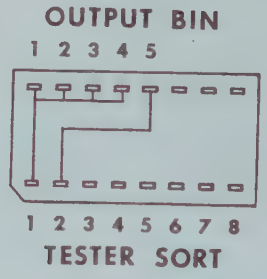
8 SORT TO 5 BIN SELECT

The handler will accept up to 8 Sort commands. There are 5 Output Bins. It is possible to have any combination of Sort commands control any combination of Output Bins. The handler is programmed by use of a 16 pin DIP type header. The placement of this header is such that it cannot be easily changed by the operator, which helps prevent Sorting errors. This header is located on the front panel PCB# 2500-058, directly above the 24 pin control connector. The white side panel must be removed to gain access to the header. The following examples will show how to wire this header.

Example: 2 sort pass/fail, 4 good bins and 1 bad bin

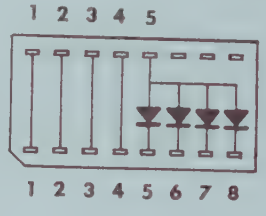
The following diagram shows a header wired for a Pass (Sort 1) and

Fail (Sort 2) application. In this case Output bins 1, 2, 3, and 4 are all good bins. The failed devices will be sorted to Output bin 5.



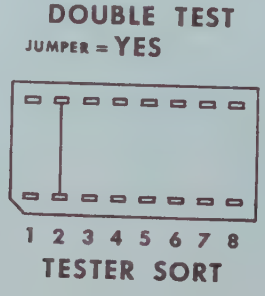
Example: 8 sort signals, 4 good categories, 4 bad categories

The following diagram shows a header wired to accept any one of 8 Sort commands. In this case Sort 1 thru 4 represents various Pass categories. Sort 5 thru 8 are various Fail categories any of which will cause the device to be sorted to Output bin 5. Note the diodes (1N4148 or equivalent) which "OR" the 4 Sort commands. Never tie more than one Sort signal to another without a diode, the handler will accept only one sort command, otherwise an error message will show up on the handler's display.



DOUBLE TEST SELECT

Located just above the Sort/Bin select header is a second 16 pin DIP type header. This header is used to cause the handler to double test the device under test under certain Sort categories. The handler will reopen and close the test contactors along with initiating a second test when told to double test. Typically all fail sort categories are to be double tested. Any or all of the 8 Sort categories can be set up to double test. The following diagram is set up for the Pass/Fail example where Sort 2 is Fail and any failed device will be retested.



RS-232 HANDLER CONTROL

The handler may be interfaced to PROM Programmers and Personal Computers via a RS-232 Port. No conventional handler control may be available or your programmer may have to be modified. Our RS-232 interface eliminates this problem. A custom software package drives a special cable (2500-097) which allows computer to computer communications. Each application nas different command sets or instructions. Consult Exatron as to availability of software for your application.

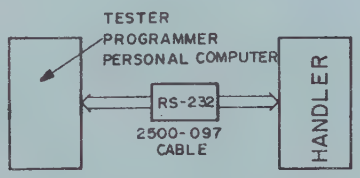
This RS-232 interface is unique to Exatron Handlers and may not be available from competitive machines.

RS-232 Cable #2500-097 is available for translating the handlers 5 volt logic port into a +12/-5 volt RS-232 port. The connector on the end of this cable is a 25 male pin type. The following lists the connectors pin assignments.

1	Ground
2	Data Out (From Computer)
3	Data In (From Handler)
7	Ground
9	+24 volts Unreg or +12 volts reg. (Must be supplied from computer.)
23	-5 volts reg. (Must be supplied from computer.) NOTE: The handler can supply only +5 volts.

The 8 Sort/5 Bin select headers and Double test headers may serve no use under RS-232 control, their function may be under software control.

Baud rates, stop bits, parity bits, etc. are all software controlled and vary with applications.



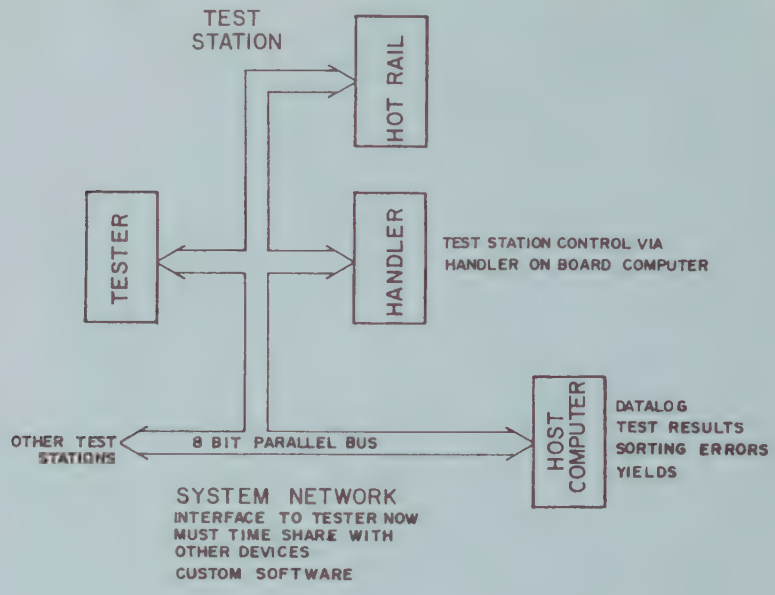
RS-232 INTERFACE
SPECIAL SOFTWARE
AS PER REQUEST

NETWORK HANDLER CONTROL

All 2000 series handlers can be equipped with a true 8 bit parallel bus computer port. Since the handler has a standard bus computer on board, any kind of interface becomes possible without massive hardware adjustments. The handler could be configured to run an entire test station. By NETWORKING all the test stations on a test

floor together into one system, greater production control can be achieved. The handler's control port now has several tasks. At one time it will communicate with the tester, or communicate with handler options like Hot Rails and SMART CARTS, or then again with a Host computer. The Host can maintain data on yields, production flow, test results, sorting errors, down load/up load programs to test equipment, etc.

Networking is as of the printing of this manual a new idea, one which Exatron fully supports. As of now there are no standards.



HELPFUL HINTS: HANDLER CONTROL INTERFACE

1. Let Exatron build it for you.

2. The handler will accept only one SORT command at a time.

3. The handler issues a 20 msec LO going start pulse only after the test head is fully closed.

4. The handler will accept either LO going pulses or LO going levels as Sort commands. If pulses are used then they must be at least 2 msec long. The handler is equipped with error correction so that it will ignore fast pulses as noise.

5. The Hot Rail option is controlled by the handler's control port. Sort lines 3 thru 8 are occasionally used by the Hot Rail. Be sure to drive the handler with open collector devices so as not to tie Sorts 3 thru 8 HI or LO.

6. End of Test, (E.O.T.) signals are not required by the

handler. The handler sorts upon the first Sort command. If E.O.T. is required in your system, then Exatron Cable #2500-120 can be supplied.

7. Never connect the handler +5 volt supply directly to the tester's supply.

GENERAL TEST HEAD INTERFACE (D.U.T. CABLING)

The test head interface connects the Device Under Test (D.U.T.) in the handler test head to the tester test socket. There are two basic types, a bench top tester signal interface, and a large test head signal interface. The 2500 is the first handler to successfully address both types. A great deal of thought and effort has gone into the basic mechanical design to allow simple and reliable interfacing to virtually any tester.

BENCH TOP SIGNAL INTERFACE

Almost all bench top testers use a green Textool zero force socket or the equivalent as a test socket. The 2500 can be placed physically closer to these sockets than any other handler. A typical cable might be only 4" long. We supply complete and well documented kits which connect the handler directly to the existing socket on your tester. NOTE: The tester socket must be in good condition. There is absolutely no need for expensive cabling or remote test heads. All kits supplied and manufactured by Exatron are fully guaranteed to work. The basic kit consists of:

1. Pre-wired Control Cable - Specify tester.
2. 0.300 Load Board - 2500-067-3/20 (for .300" to 20 pins).
3. 0.600 Load Board - 2500-067-6/40 (for .600" to 40 pins).
4. 14 pin Adaptor Cable - Length varies - 2500-075-14-S.
5. 16 pin " " " " - 2500-075-16-S.
6. 18 pin " " " " - 2500-075-18-S.
7. 20 pin " " " " - 2500-075-20-S.
8. 24 pin " " " " - 2500-075-24-S.
9. 40 pin " " " " - 2500-075-40-S.

NOTE: S = Standard Length.
Some kits may vary due to the special requirements of a particular interface.
New 24/28 pin .300" wide devices can be handled with the Model 2500, cables must be special ordered.

LARGE TEST HEAD SIGNAL INTERFACE

Most large test head interfaces could be done using a bench top interface kit. There are no mechanical or electrical portions of the

handler which protrude higher than the base of the test contactors. Most every critical large test head interface will be custom made. We build the interface to use as much of your existing hardware as possible.

IMPORTANT FACTS

1. Pin 1 is always down on Exatron tester interfaces.

2. Pin 1 is almost invariably up on bench top testers, since most Textool test sockets are Pin 1 up. Therefore, the device will be Pin 1 up in the handler.

3. Pin 1 could be either up or down on a large test head interface.

4. Center to center contact spacing on a 0.300" test head is 0.800".

5. Center to center contact spacing on a 0.400" test head is 0.900"

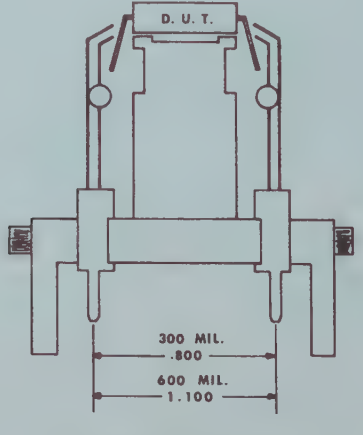
6. Center to center contact spacing on a 0.600" test head is 1.100".

7. Pin 1 on a 2500 is generally on the opposite side than that of most other handlers, i.e. their Pin 40 is our Pin 1.

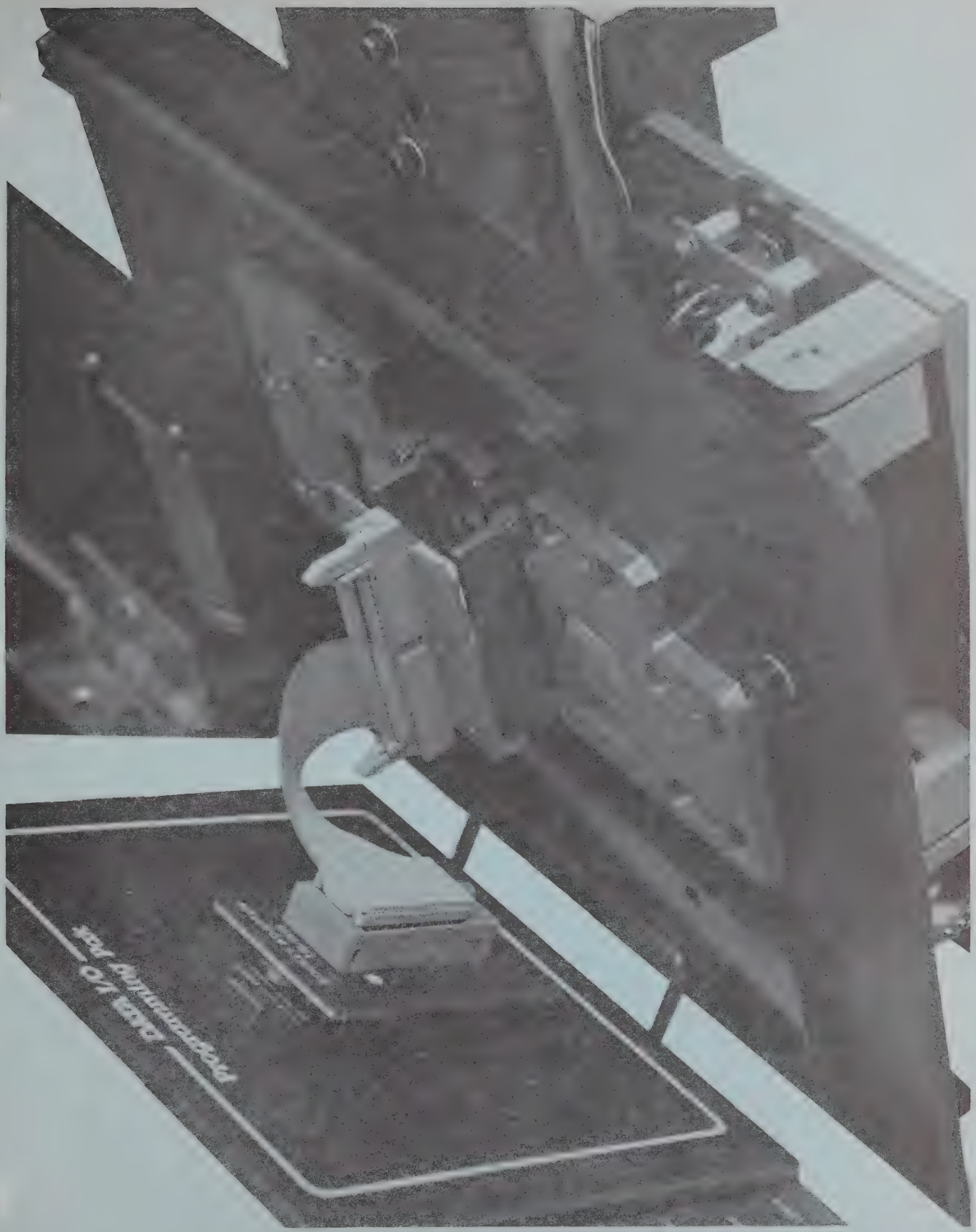
8. There is no need to "scramble" test head signals as the pin 1 on the 2500 is physically in the same place as that of the Textool test socket.

9. A 0.125" diameter test head guide pin can be added to an existing hole in the test head mounting block.

10. Test head guard blocks - standard.

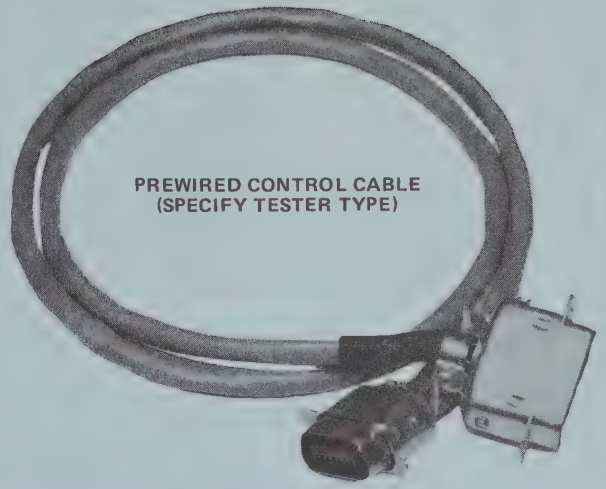


CONTACT METHOD

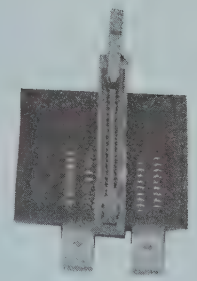


TYPICAL BENCH TOP TESTER SIGNAL INTERFACE

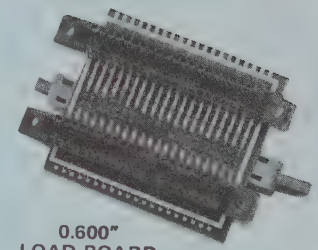
40 PIN
2500-075-40-S



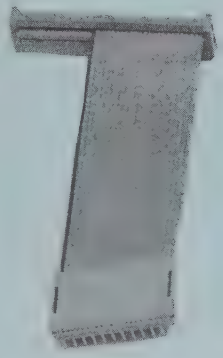
PREWIRED CONTROL CABLE
(SPECIFY TESTER TYPE)



0.300"
LOAD BOARD
2500-067-3/20

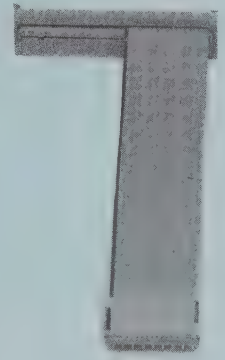


0.600"
LOAD BOARD
2500-067-6/40

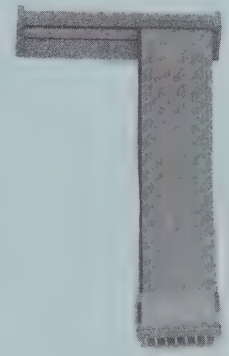


24 PIN
2500-075-24/6-S

20 PIN
2500-075-20-S



18 PIN
2500-075-18-S



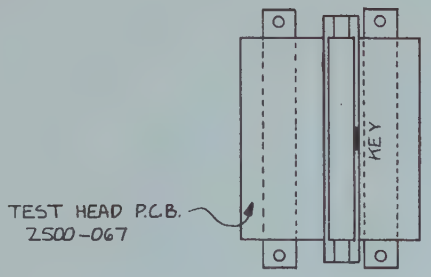
16 PIN
2500-075-16-S

14 PIN ADAPTOR CABLE
2500-075-14-S

STANDARD BENCH TOP INTERFACE KIT

2/84

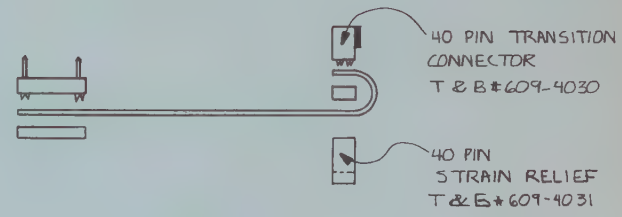
REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

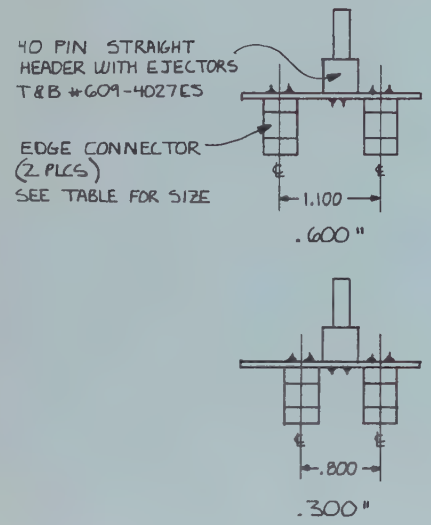


TEST HEAD ADAPTOR BOARDS

	EXATRON PART #	WIDTH	#PINS	SULLINS CONN.#
	2500-067-6/40	.600	40	EZC 20 DRSH
*	2500-067-6/24	.600	24	EZC 12 DRS H
*	2500-067-3/24	.300	24	EZC 12 DRSH
	2500-067-3/20	.300	20	EZC 10 DRSH

* = SPECIAL ORDER



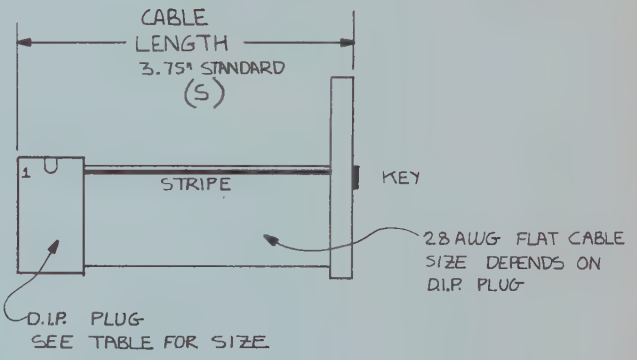


D.I.P. CABLE ADAPTORS

	EXATRON PART #	WIDTH	#PINS	T&B HEADER #
	2500-075-40-S	.600	40	609-M40STH
*	2500-075-28-S	.600	28	609-M40STH
	2500-075-24/6-S	.600	24	609-M24STH
*	2500-075-24/3-S	.300	24	
	2500-075-20-S	.300	20	609-M20STH
	2500-075-18-S	.300	18	609-M18STH
	2500-075-16-S	.300	16	609-M16STH
	2500-075-14-S	.300	14	609-M14STH

* = SPECIAL ORDER

NOTE: ALL CABLES SUPPLIED AT 3.75" LONG CHANGE THE "-S" TO A LENGTH IN INCHES FOR CUSTOM LENGTH CABLE



		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± .005 2 PLC DEC ± .01 INTERPRET THIS DWG PER USA STANDARDS	SIGNATURE AND DATE DRWR 11-27-82 DRFTG CHK DESIGN CHK PROJ MNGR APVD
NEXT ASSY	USED ON	MAT'L SEE NOTES	FINISH

exatron

TITLE: BENCH TOP TESTER SIGNAL INTERFACE

SIZE C | DRAWING NO 2500-075 REV. A

TESTER

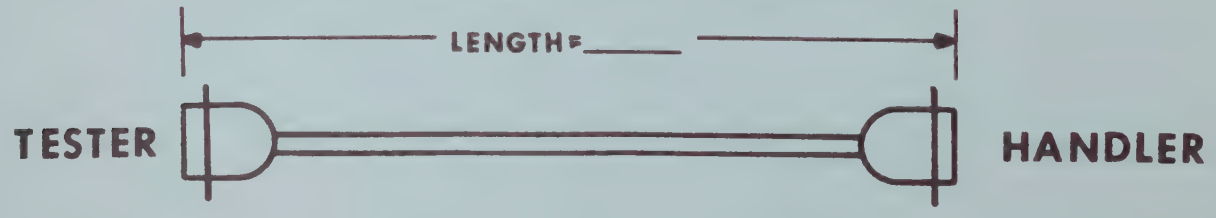
CONTROL INTERFACE

TYPE _____ MODEL _____

MODEL _____

DATE _____ REV _____

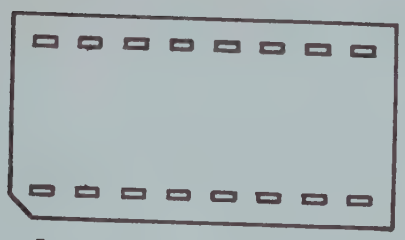
LABEL	PIN	WIRE COLOR	PIN		LABEL	OUTPUT BINS	DOUBLE TEST
			1	- SORT 1			
			2	- SORT 2			
			3	- SORT 3			
			4	- SORT 4			
			5	- SORT 5			
			6	- SORT 6			
			7	- SORT 7			
			8	- SORT 8			
			10	- START			
			22	- OUT 1			
			9	- OUT 2			
			21	- OUT 3			
			11,23	- 5 VDC	NOT NORMALLY CONNECTED. FOR INTERFACE CIRCUITS ONLY.		
			12,24	- GROUND			



	SIZE	24 PIN RIBBON
	VENDOR	AMPHENOL
	PART NO.	57-30240
	PIN SEX	MALE

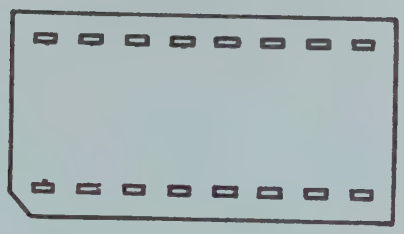
NOTES _____

DOUBLE TEST
YES



TESTER SORT

OUTPUT BIN
1 2 3 4 5



TESTER SORT

TEST HEAD ADAPTOR

_____2500-067-6/40

_____2500-067-6/24

_____2500-067-4/24

_____2500-067-3/40

_____2500-067-3/24

_____2500-067-3/20

_____ 2500-075-40/6_____

_____ 2500-075-28/6_____

_____ 2500-075-24/6_____

_____ 2500-075-22/4_____

_____ 2500-075-28/3_____

_____ 2500-075-24/3_____

_____ 2500-075-20/3_____

_____ 2500-075-18/3_____

_____ 2500-075-16/3_____

_____ 2500-075-14/3_____

_____ 2500-075-08/3_____

APPLICATION NOTE

Date: 12-29-83

Purpose: 24/28 pin by .300" test head.

For: Model 2500 Handlers

There is a new "Skinny Dip" package which is a 24 pin or 28 pin device on .300" centers. A standard 2500 is shipped with a 20 pin by .300" test head. To add the additional 4 to 8 pins to the test head requires the following kits.

24 PIN SKINNY DIP ONLY

QTY.	DESCRIPTION	PART NUMBER
4	Single Pin Contact	CON-1-PMS
1	25 Pin x 300" Cable	2500-075-24/3-S
1	24 Pin x 30" Load Board	2500-067-3/24

24 AND 28 PIN SKINNY DIP KIT

QTY.	DESCRIPTION	PART NUMBER
2	10 Pin Contacts	CON-10-PMS
1	24 Pin x 300" Cable	2500-075-24/3-S
1	28 Pin x 300" Cable	2500-075-28/3-S
1	40 Pin x 300" Load Board	2500-067-3/40

SECTION IV

FRONT PANEL CONTROLS

AUTO-MANUAL Toggle Switch

When the switch is set to AUTO the handler will continously cycle devices. The handler will automatically stop if it runs empty, if the output tubes fill, or if it jams, the display will indicate what to do if the handler stops. The handler will automatically restart when more devices are loaded in.

When the switch is set to MANUAL, the lower row of switches becomes functional. The MANUAL switch should also be used as a "Panic Button" if a problem arises. The handler must complete a full cycle before the handler can enter the manual mode.

MOTOR OFF/ON TOGGLE SWITCH (Motor Power Switch)

This switch should normally be left ON. In the event of a shuttle jam or if the shuttle must be centered, then turn the MOTOR OFF to free the shuttle. Be sure to turn it back on again.

NOTE: The motor holds the shuttle in a fixed position and can only be moved by the computer if the motor power is ON.

RUN—Blue Pushbutton

In the AUTO mode, the RUN button starts the handler. This button can also be used as a "yes" button. The answer "yes" is required at certain times to answer questions the computer asks when jammed.

Also during most jams, the RUN button will allow the handler to try and free the jam. Depending on how the handler is jammed,the RUN button could be considered like a "Help" button. See the Error Messages; What to do ? section for details.

STEP — Yellor Pushbutton

While in the MANUAL mode, this switch will allow the handler to cycle one device at a time. Push the button once to step a device into the test head. Push it again, and the device will be binned according to the sort command. A second device will fall into the test head and be tested. This second device will not be binned until the STEP switch is pushed again or held in.

RETEST – Yellow Pushbutton

The Handler must be in the MANUAL mode and one device placed into the test head by the STEP switch. Now the device can be "Retested" by pushing the Retest switch. As many tests as desired can be performed without binning the device. To drop the device push the STEP button and the device will be binned according to the last sort signal received.

TOTAL/FLUSH – Momentary Toggle Switch

The TOTAL switch, when held in the up position, will slowly display the total number of devices which have been binned to each output. Each counter can count up to 999,999 before zeroing out and counting up again. Turning the handler power OFF/ON will also reset all counters to zero. These counters are useful for overall inventory control.

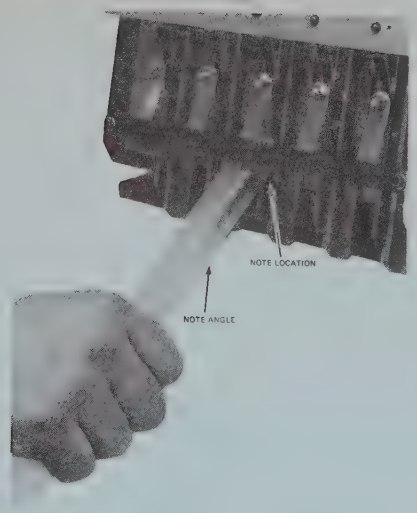
The FLUSH switch, when held in the down position, will cause all of the solenoids controlling the stepping of the devices thru the handler to activate. This allows all of the devices currently in the input of the handler to dump straight thru into output tube 3. This feature should be used to empty the handler when the devices are loaded in backwards, thus not electrically damaging devices by testing them with backwards power and ground. The handler will automatically check if the shuttle is in the right place and that there is a tube in output #3. If either is not O.K., then an error message will be displayed.

The FLUSH switch is also used to help clear certain kinds of jams and will then drop only the jammed device, not all of the input devices. The solenoids stay on for as long as the switch is held down. Once released, the handler will require the operator to remove the tube in output 3 for retesting, even if no parts fall into tube #3.

COUNT UP/DOWN – Momentary Toggle Switch

The COUNT switch allows the setting of the number of devices to be placed in each output tube. When help UP the count is advanced by 5 when held DOWN the count is decreased by 1. Once the desired set count is achieved, the RUN button must be pushed to continue operation.

NOTE: If the count is decreased after the initial setting, then empty all ouput tubes. The ouput tubes may overflow if they previously contained devices. The count can be increased without any problems.



OUTPUT TUBE INSTALLATION (Photo 1)

OUTPUT TUBE INSTALLATION (Photo 2)

OUTPUT TUBE INSTALLATION (Photo 3)

SECTION V

HANDLER SET UP

1. BEFORE OPERATING HANDLER REVIEW THE PROPER OUTPUT TUBE INSTALLATION SECTION. PRACTICE INSERTING OUTPUT TUBES UNTIL YOU FEEL COMFORTABLE.
2. Install correct 0.300" or 0.600" test head.
3. Set package thickness with same devices.
4. Check shuttle and output tube holder location.
5. Check Pin 1 adjustment
6. Check tilt base slide angle.
7. Check test head cable and control cable.
8. Set the Package Length switch.
9. Plug in power supply power and turn on handler.
10. Empty and replace all output tubes.
11. Set tube full count to equal total number of devices per tube - push RUN.
12. Load devices and run handler.

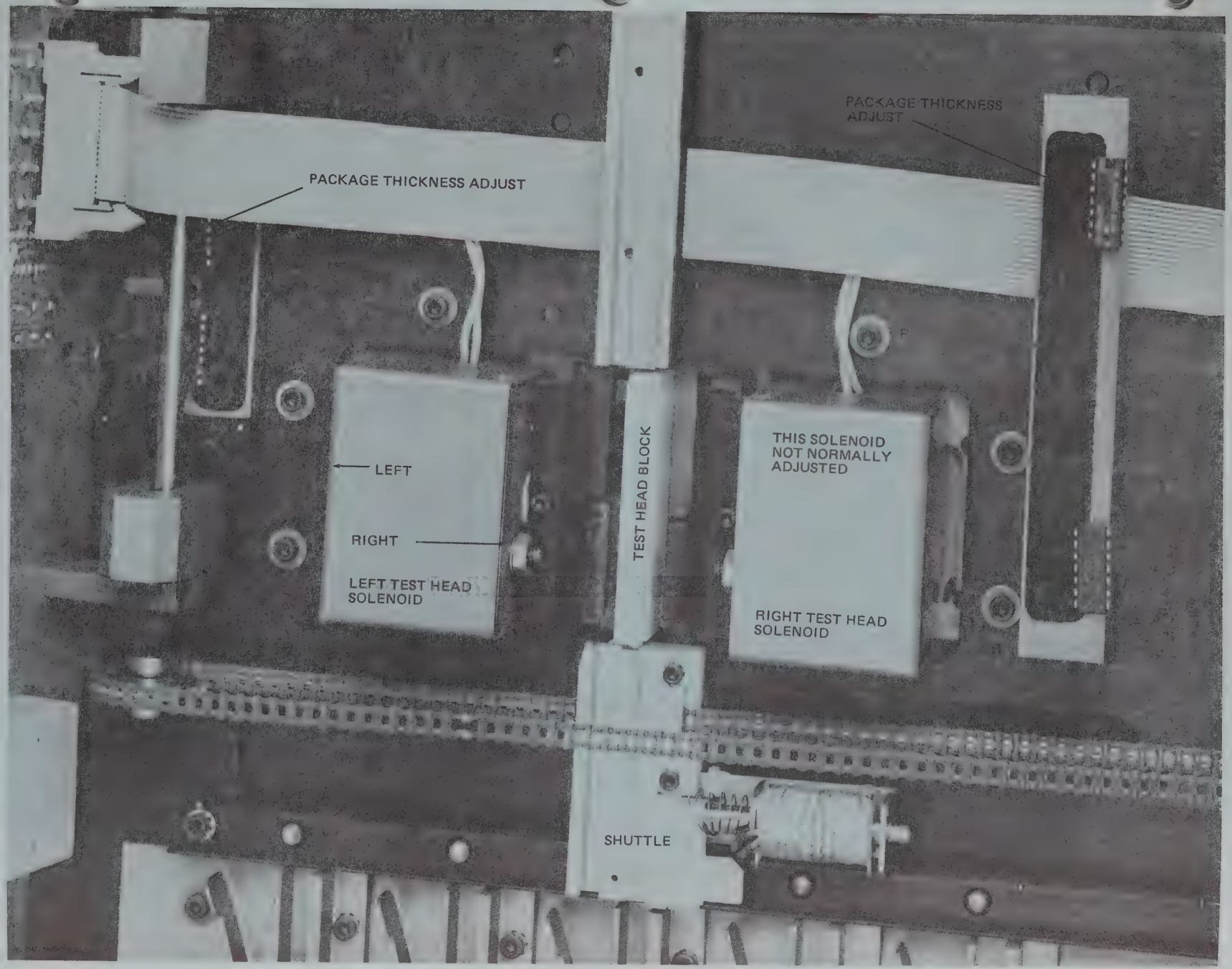
1. PRACTICE PROPER OUTPUT TUBE INSERTION.

A. If the Handler is waiting to fill an output tube, the operator has two seconds to install an empty tube before the handler will try to bin the device.
B. Always insert empty tubes in the output. Never use tubes which are too short to hold the number of devices the tube counter is set for.
C. Check the bottom end of the output tube for a pin or cork.
D. Follow the photos for proper output tube insertion technique. Always start with the tube at an angle.
E. The second photo demonstrates the output tube starting to go under the rubber bumper which will hold the tube snugly in place.
F. In photo three, push up on the tube until it runs into a stop located at the bottom of door. NOTE: It is possible to force the tube past this stop which will cause a shuttle jam.

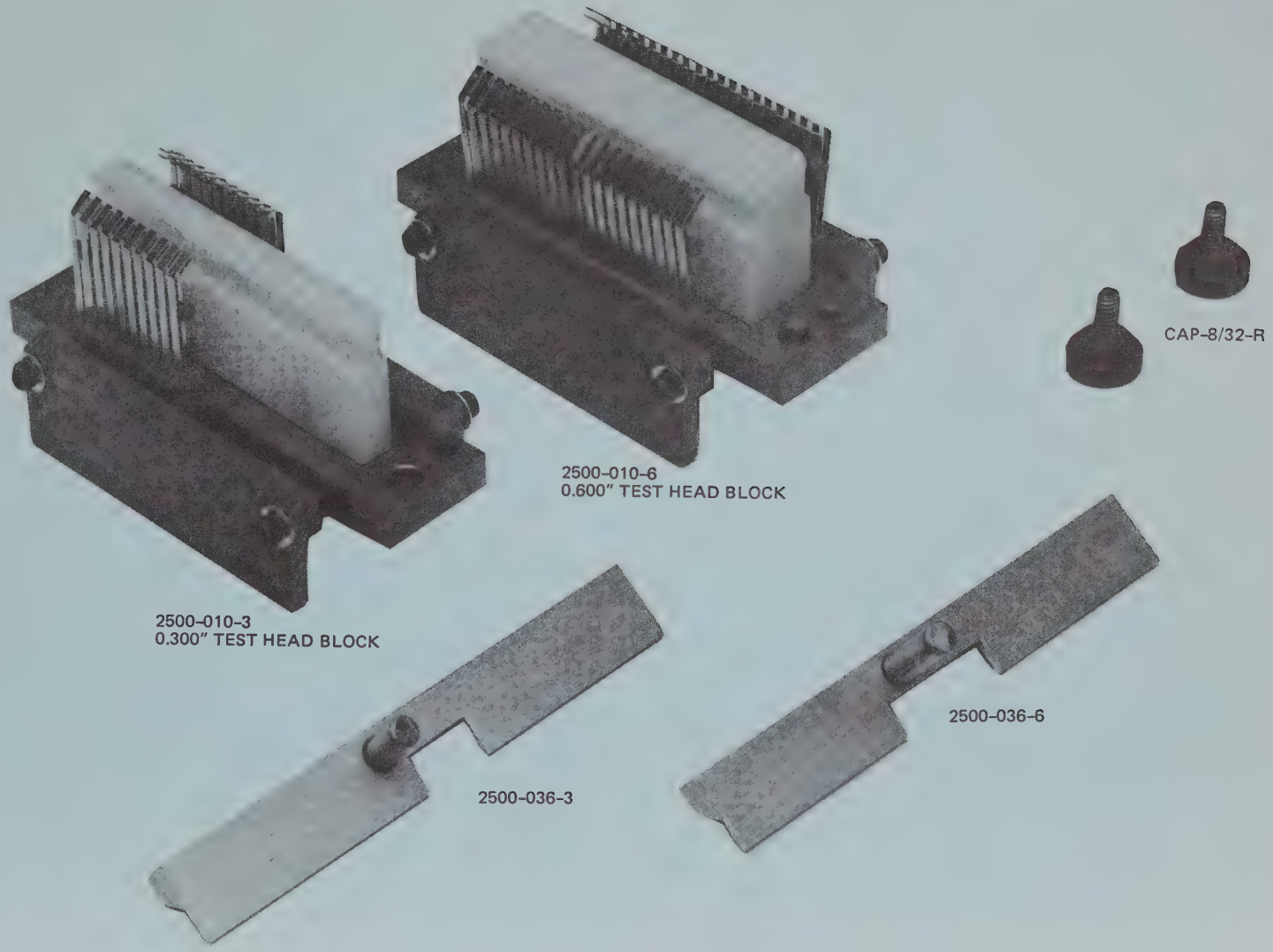
2. Install Correct 0.300" or 0.600" test head.

(See Test Head Area Detail Photograph)

A. Locate test head storage box and 7/64" allen wrench for #6 allen bolts. (Wrench is stored on door of handler.)
B. Remove the two red #8 thumb bolts which hold the blue test head block to the black main plate.
C. Lift test head block away from handler.
D. Loosen, but do not remove, three each #6 allen bolts marked "L".
E. Push left test head solenoid all the way to the left.
F. Replace correct size test head block.
Note: Block to be automatically aligned by two pins protruding from the main plate.



TEST HEAD AREA CLOSE UP



2500 CHANGE OVER KIT

G. Replace two red thumb bolts, finger tighten only.
H. For 0.300 test head blocks, move left test head solenoid all the way to the right.
I. Tighten all three #6 allen bolts marked "L".
J. Note: The right test head solenoid is factory set for proper contact pressure. Should it become necessary to change the position of the right solenoid, loosen but do not remove the three each #6 allen bolts marked "R". Move the right solenoid to desired location. Tighten all three allen bolts.
K. Note: The correct contact pressure/location for the left test head solenoid has been factory set for both the 0.300" and 0.600" position. Should it become necessary to change this position, loosen but do not remove the three each #6 allen bolts marked "L". From the back side of the handler, locate the two #6 allen bolts which act as "stops" on the top slot of the blue plate which holds the left solenoid to the black main plate. Adjust accordingly and retighten the three each allen bolts marked "L".

3. Set package thickness with sample devices.

(See Test Head Area Detail Photograph)

A. Locate 4 sample devices, 3 if using 40 pin devices, which are exactly the same thickness as the parts to be tested. These devices do not need to be good devices.
B. Place the two devices marked "A" on the large blue block near the Electronics Front Panel. Locate parts at top and bottom of the block. On the right side, the parts are to straddle the largest side of the block.
C. Replace the two devices marked "B" under the door hinge bar,(only 1 device if using 40 pin devices.)
D. Holding the door open, push the door to the left, causing the hinge bar to pull up and off the sample devices.
E. Loosen but do not remove the black #8 thumb knob marked Thickness Adjust on the back side of the main plate. Slide the knob and block to the left.
F. Close the door. The sample devices are now outside of the door. On the left side, the parts are to straddle over the largest side of the block.
G. Repeat steps D, E, & F, to put new sample devices under the door hinge bar. Retighten the black thumb knob.

4. Check shuttle and tube holder location.

A. See Test Head Area Photograph.
B. To center Shuttle, turn motor power off. Rotate the chain until the shuttle is aligned with the test head block as in the photos. Turn motor power on and recheck the location of the shuttle.

C. The location of the shuttle can be fine tuned by loosening, but not removing, the two #4 allen bolts which hold the bottom shuttle track to the shuttle block. Be sure to retighten the two #4 allen bolts. This procedure is not normally required.
D. Check the output tube location relative to the shuttle by placing a tube in output #3. Center of the tube should be centered on the bottom shuttle track.
E. To adjust the output tube alignment, loosen but do not remove the four #6 allen bolts which hold the output tube plate to the main plate. Adjust accordingly, retighten all four #6 allen bolts. Note: The adjustment is made for all five output tubes at one time.
F. NOTE: Each individual output tube holder can be fine tuned by loosening the two #6 allen bolts which hold it to the output tube plate. IMPORTANT: This is a factory adjustment and it is recommended that this adjustment not be attempted in the field without proper factory training.
G. NOTE: There is no need to adjust the output tube holder for 0.300" or 0.600" tubes of varying thickness or shape.

5. Check pin 1 adjustment.

A. Put handler in "MANUAL" mode.
B. Turn handler power on, place one device with pin 1 in correct position in handler.
C. NOTE: Pin 1 could be up or down depending on the tester interface. This should be noted on the front door of your handler.
D. "Cycle" the device into the test head, but do not drop it into the shuttle.
E. Check the device pin alignment with the test head contactors by looking through the large cutouts in the door.
F. If adjustments are necessary, simply turn the large silver #10 thumb knob on the front door of the handler. Carefully align the device and the test head contactors.
G. Confirm alignment by pushing "Reset" to see if the device in the test head passes.

6. Check tilt base slide angle.

A. The blue tilt bar is located on the right side of the handler. Exercise caution when adjusting slide angle.
B. To change the slide angle, loosen but do not remove the bottom #1/4 silver thumb knob on the base plate.
C. DO NOT LET GO OF THE HANDLER, DAMAGE OR INJURY COULD RESULT.
Hold the handler and remove the upper #1/4 silver thumb knob. Select the proper angle and replace the thumb knob.

D. Finger tighten both knobs, do not tighten with tools.
E. NOTE: The slide angle needs to be adjusted when large ceramic devices are to be tested. A steep angle will cause the devices to exit the handler into the output tubes at too fast a speed. The devices may chip or crack upon impact with other devices. Decreasing the slide angle and increasing drag and friction helps to eliminate chipping. The recommended angle for all plastic devices is as close to vertical (12) as possible, top tilt bar position. Depending on the mass and shape of the ceramic device the angle may or may not have to be adjusted. The proper position must be found experimentally. The handler cycle timing is sensor controlled so the cycle speed will automatically be slowed to match that of the devices to be tested.

7. Check Test Head Cable and Control Cable.

A. Be sure test head cable is properly connected to the test head contactors.
B. Be sure the cable is properly connected to the tester. Check Pin 1 for correct direction.
C. Plug in both ends of the control cable.
D. NOTE: See the Handler Interface Section for proper construction and wiring of test head and control cables.

8. Set the PACKAGE LENGTH Switch.

A. This four position slide switch is located on the door of the handler.
B. Depending on the length of your part, set the switch accordingly:

8 - 12 pins
14 - 22 pins
24 - 32 pins
34 - 40 pins

C. An improper setting will result in multiple devices in the test head or a jam at the input.
D. The package width has no effect. A 24 pin 0.600" wide device will be set to the same place as a 24 pin 0.300" wide device.

9. Plug in Power Supply and turn on Handler.

A. The handler power supply can be wired for 110VAC or 220VAC 50/60 Hz. See Power Supply Section for conversion.
B. Be sure that the power supply is plugged into the proper power outlet.
C. Connect the 6 pin power cable from the right side of the handler's electronics to the front of the power supply. NOTE: The connector is keyed and cannot be improperly connected.

D. Turn Handler power on.
E. The Alpha/Numeric Display should light and display a message. If not, turn power off immediately and check all connections.

10. **Empty and replace all output tubes.**
(See Proper Ouput Tube Installation Section)
A. When the handler is powered up all internal counters are set to zero.
B. All the output tubes must be removed (in any order) and replaced with empty tubes.
C. If the output tubes are too short or have some devices in them the handler will overflow the tubes causing a jam and improper device counts. If this occurs, review Error Message Section.
D. Not all outputs need to have tubes. The handler will simply stop if the tube is missing or full. Try to keep the tubes closest to the center tube #3 empty since this will speed handler operations.
E. The tube count is automatically set to zero when that tube is removed.

11. **Set Tube full count to equal total number of devices per tube — Push RUN.**
A. Once the output tubes have been cleared the handler will automatically ask the operator for a tube full count.
B. The count should be set to match the number of devices which are in each tube to be tested. NOTE: Do not exceed the output tubes capacity or a jam will occur.
C. By holding the COUNT level switch up, the counter will advance by multiples of 5.
D. By holding the COUNT level switch down, the counter will decrease by 1.
E. Once the count is set, push the RUN button to continue. The tube full count can be reset at any time, as long as the handler is in the MANUAL mode.

12. **Load Devices and run Handler.**
A. If in MANUAL mode, see Front Panel Controls Section for operation.
B. If in AUTO mode, push the run switch.
C. The handler should run continuously until all outputs are full, the handler runs empty, or a jam occurs. The Alpha/Numeric Display will inform the operator of the condition of the handler.
D. The handler will automatically restart if more devices are loaded in. There is no need to push the "RUN" button if the handler runs empty.
E. Use the MANUAL/AUTO switch as a Panic Button. Should a problem arise, switch to "MANUAL". The handler will automatically stop as soon as that individual cycle is completed.

SECTION VI

ERROR MESSAGES: WHAT TO DO?

1. **A FULL TUBE = – –**

   A. The computer is asking for the number of devices which will fill the output tubes.

   B. See set up instructions. Count up/down switch.

   C. Push RUN switch to continue.

2. **ALL OUTPUTS FULL**

   A. The LED's over the output tubes will flash to indicate which output tubes need to be emptied.

   B. Replace all of them with empty tubes.

   C. Note: The handler is waiting to bin a device. The operater has two seconds to replace any tube before the handler will automatically start. Be sure to replace the output tube quickly.

3. **CENTER SHUTTLE**

   A. Turn the motor power OFF.

   B. Re-align the shuttle with the test head block. This can be done without opening the door by rotating the chain sprocket, which protrudes slightly out from under the left hand side of the door. Check the alignment by looking thru the right hand cut out on the door.

   C. Turn the motor power ON.

   D. The shuttle is not aligned correctly. It is possible that the shuttle has a device in it. The device can be flushed out by using the flush switch.

4. **CLOSE DOOR**

   A. Check to be sure all of the proper thickness spacer I.C.'s have been installed.

B. Close latch on the handler door, finger tighten ONLY.

C. Be sure both door latches are closed.

5. **DIP IN SHUTTLE**

A. Before each cycle, the handler checks to be sure that no devices are in the shuttle.

B. To clear a device, put a tube in output tube 3, push down on the FLUSH switch and the device should fall into output tube 3. Output tube 3 will then have to be retested.

C. If the shuttle is slightly out of alignment with the test head block, the computer may think a part is in the shuttle. Turn the motor off and realign the shuttle. Be sure to turn the motor power back on.

D. Open the door and remove the part. Note: Be sure all of the input tubes/input devices have been removed.

6. **DIP IN TEST SITE:**

A. Before each cycle, the handler checks to be sure no device is in the test site.

B. To clear device, put a tube in output 3, push down on the FLUSH switch and the device should fall into output tube 3, output tube 3 will then have to be retested.

-or-

C. Open door and remove part. Note: Be sure all input tubes/input devices have been removed.

7. **EMPTY ALL TUBES:**

A. The handler automatically sets all of its internal counters to zero when the power is turned on, and it has no way to know if there are any devices in any of the output tubes.

B. All output tubes must be removed, in any order and replaced with empty tubes.

C. Be sure tubes are the right length, have no burrs, and the stopper has been removed.

D. If the handler's output tubes are in fact empty, the blue RUN push button can be used to eliminate having to remove the ouput tubes. Caution should be used since any tubes which in fact have devices in them will overflow causing a jam.

8. EMPTY ON JAM

A. If the handler runs empty, reload devices to continue operation.

B. It may be necessary to push the RUN switch to initially start testing device or if the handler is in the MANUAL mode.

C. If the handler is not empty, then the device to be tested is jammed and has not fallen into the test site.

D. If the devices are locked together at the top of the handler, check to see, then proper size is selected on the 4 position LENGTH SELECT switch.

E. Push the RUN button, this will recycle only the input/stack solenoids and should clear the jam.

F. If the part can be "Nudged" to fall into the test site the handler will automatically continue.

G. When all else fails, remove all input tubes/devices and open the handler door and remove the jammed device.

H. Put the handler in the MANUAL mode and push the RUN button to reset the handler back to the beginning of a cycle.

9. FLUSH HANDLER

A. Handler in FLUSH routine, will be displayed as long as the flush switch is held down.

B. See Front Panel Controls Section IV for operation.

10. INTO SHUTTLE JAM

A. CAUTION - The Shuttle may move up upon freeing the jam. Be sure there is nothing blocking the shuttle's travel. Keep your fingers out of the shuttle's path at all times.

B. The device in the test head has failed to fall into the shuttle.

C. Push the RUN switch, this will recycle only the stop solenoid and may clear the jam.

D. If the device can be "Nudged" to fall into the shuttle, the handler will automatically start up.

E. If all else fails, remove all input tubes/devices and open the door and clear the jam.

F. Put the handler in the MANUAL mode and push the RUN button to reset the handler back to the beginning of a cycle.

11. IS THE MOTOR ON?

A. If the motor is ON then a more serious jam may be occuring.

B. If the motor is OFF, turn it back ON again. Push the RUN button. The handler should continue its operation.

C. Note: The shuttle will move as soon as the RUN button is pushed.

12. MEMORY ERROR

A. When the Handler powers up it automatically verifies its internal RAM memory.

B. If the Handler fails to pass this test, this message will be displayed.

C. There is no way to proceed until the memory problem is corrected.

D. Call the factory for assistance.

13. MANUAL MODE

A. Single step operation.

14. NO BIN SORT ?

A. The handler has received the SORT signal indicated by the display.

B. This sort signal has no corresponding output BIN. The handler cannot BIN the tested device. Only SORT signals which have corresponding BINS will be accepted.

15. NO OUTPUT TUBES:

A. There may be some output tubes installed, but not in the BINS the handler wants to go to.

B. The LED's over the missing outputs will blink, one or more of these outputs must have a tube installed.

C. Note: The handler is waiting to bin a device. The operater has two seconds to replace any tube before the handler will automatically start. Be sure to replace the output tube quickly.

16. NO OUTPUT TUBE 3

A. If during a flush there is no tube in output tube 3, the handler will not drop the devices until a tube is inserted.

B. If while holding the flush switch down a tube is inserted, the devices will fall. But if the switch is let go then a new flush cycle will have to be performed.

17. NO PART TO TEST

A. Handler has been told to test with no device present in test site.

18. NO TUBES OR FULL

A. The LED's over the output tubes will flash to indicate which tubes need to be emptied and which are missing.

B. Replace with empty tubes all of the outputs which have blinking LED's over them.

C. Note: The handler is waiting to bin a device. The operater has two seconds to replace any tube before the handler will automatically start. Be sure to replace the output tube quickly.

19. **O.K. TO RETURN?**

A. After an output jam has been cleared this message will indicate that the shuttle is now clear of devices.

B. Push the RUN button. The shuttle should return home.

C. The handler should resume normal operation.

20. **OUTPUT TUBE JAM.**

A. The tube may be over filled and must be replaced with proper size tube or the tube count may be set too high.

B. The tube may be blocked or improperly inserted into into the tube holder.

C. The device may have a badly bent pin preventing its fall into the tube.

D. The part may be stuck in the shuttle.

E. Push the RUN button to recycle the shuttle solenoid. Wiggle the tube at the same time to free a jam.

21. **PROM REV --/--**

A. Indicates date of last revision of handler software.

B. Indicates optional software packages.

22. **PUSH RUN SWITCH**

A. Will advance the handler out of an error routine, and back to the front panel controls.

B. Note: Whatever problem caused the handler to go into an error routine should be corrected before continuing.

23. **READY TO RUN**

A. Load devices to be tested, push RUN switch.

24. **RETEST OUTPUT 3**

A. After a flush, the devices in output 3 must be

removed and retested before normal operation can continue.

B. Replace output tube 3 with an empty tube.

25. SHUTTLE HOME JAM

A. The shuttle has jammed after the device has been binned and the shuttle is trying to go to its home position, output 3.

B. There is a sensor on the shuttle which looks for the device to fall into the output tube. It is possible that a part may fall past this sensor but still be slightly in the shuttle. If the shuttle tries to move it will be stopped.

C. The output tubes can be removed during this jam without affecting the counters.

D. Get the device out of the shuttle and into the tube properly.

E. Turn the motor OFF. Rotate the chain sprocket which protrudes out from under the left hand side of the door until the shuttle lines back up with the test head block. Turn the motor ON again.

F. Push the RUN button to continue.

26. SHUTTLE JAM

A. A jam has ocurred between the home position (output 3) and one of the other outputs. There should still be a device in the shuttle which is waiting to be binned.

B. Check the door to be sure that both latches are properly closed.

C. Check to be sure that all of the spacer I.C.'s are properly installed.

D. Check that no output tubes have been inserted past their stops and blocking the shuttle.

E. Turn the motor OFF. Rotate the chain sprocket which protrudes out from under the left hand side of the door until the shuttle lines up with the proper output tube, the one with the lighted L.E.D. Turn the motor back ON.

F. Push the RUN switch. Only if the shuttle is over the right output will the part drop into the tube. Normal operation should occur.

G. If all else fails, remove all of the input tubes/ devices and open the door and remove the jam. Realign the shuttle jam with the test head block.

H. Switch to manual and push the RUN button to continue with a new cycle.

I. Note: The device in the shuttle will only be counted if it falls into the ouput under the computer's control.

27. SORT ERROR

A. If the handler receives 2 or more SORT signals at the same time, it will display this error.

B. Check your interface tester. At no time should the handler receive more than 1 SORT signal.

28. TESTER SORT——

A. Displays which of the eight possible SORT signals were received from the tester.

29. TEST IN PROCESS

A. The handler thinks the device in the test head is being tested. Only a BIN signal from the tester can reopen the test head.

B. Note: Do not attempt to run the handler without a proper interface.

C. Turn OFF all power to the handler until the interface problem is corrected.

30. ZERO COUNT ERROR

A. This will be displayed if you try to load 00 into the tube full counter. A zero count means an empty tube is full. This will cause the handler to lock up.

B. Set the tube full counter to the proper amount, anything other than zero.

31. **25 FULL/ - - 3 - - - 14**

A. What the tube full counter is set for, example count set for 25.

B. Current count in the output bin selected, example tube currently has 14 devices.

C. Full/ - - 3 - - indicates which, if any, output tubes are now full. Example shows BIN 3 filled.

D. Insert empty tubes to clear each output counter.

SECTION VII

HANDLER OPTIONS

There are several options available for the Model 2500 Handler. Please consult the factory regarding any special requirements your particular application may have.

SPARE PARTS KIT

The spare parts kit for the handler includes samples of all nuts, bolts, washers, spare set of ICs, switches, LEDs, solenoids, motors, and other parts that have been found to cause field problems. In general, the kit will decrease the downtime. During warranty of the handler, any part that fails and is returned to Exatron will be replaced at no charge.

The spare parts kit is supplied in a steel tool box. The kits are organized with smaller compartmented boxes inside the main tool box. Each compartment is labeled and a complete parts list is included listing the contents of each compartment. See the spare parts list at the back of this manual. All spare parts are listed by their actual vendor part number to avoid confusion and preserve their original indentity.

AUTO TUBE LOADER

The Auto Tube Loader will automatically shift two input tubes when one of them runs empty. This increases the throughput while allowing operator flexibility to perform more tasks. This option is useful for programming E.P.R.O.M.s when the programming time may run to several minutes as it allows the handler to run longer without operator assistance.

The Auto Tube Loader may be added at a later date to any ambient only 2500 or 2900 handler. There is also a software change which requires the changing of the E.P.R.O.M. set on the C.P.U. card.

TEST STATION CART

The Model 2500 and Model 2900 handlers bolt directly to the top of the test station cart. The module or table is 36" wide and 24" deep, allowing a programmer or benchtop tester to be placed very close to the handler. Locking wheels provide flexibility in locating the test station where it is most needed at that time. The height of the cart is adjustable from 20" to 36" high to allow every operator easy loading of devices into the handler/hot rail. This is particularly valuable when using the environmental option on top of a handler. There is a locking drawer for storage of extra interface cables and spare parts. Custom carts are available to your specifications.

PASS/FAIL OPTION

There is a special hardware and software package available for Pass/Fail interface applications. This option allows the handler to be immediately interfaced to your tester. All

initial set up steps will be performed at the factory. The option includes:

1. Choice of 3 Pass/2 Fail Bins or 4 Pass/1 Fail Bin.
2. Prewired Bin Select and Double Test on Fail headers.
3. Automatic Interface Cable installed.
4. Blue anodized Pass Bin tube holders, red anodized Fail Bin tube holders.
5. Total Pass/Total Fail parts counter.
6. Easy to Understand Operator Prompts.
7. Pass/Fail Simulator P.C.B.
8. Prewired Control Cable.

8 SORT CHECK OUT BOX WITH SOFTWARE

The 8 Sort Check out box is a semi-automatic 8 sort simulator box. The check out box connects to the handlers control port. Any of the 8 sort signals can be sent to the handler by pushing one of the buttons on the box. The handler will then respond to the signal. One of the 8 buttons must be pushed for each cycle of the handler thus allowing semi-automatic operation.

A special check out R.O.M. is included with this option. The R.O.M. contains several handler check out routines which are called up by the buttons on the check out box. Each button calls a different check out routine. These routines include:

1 Run Motor/Shuttle Check
2 Display Check/L.E.D. Check
3 Opto Sensor Check
4 Run Solenoids Check
5 Interface I/O Check
6 Tube Switch Check
7 Front Panel Switch Check

See section nine for explanation on operation of each handler check out routine. Additional or custom check out routines might be added.

PLASTIC TEST STAND

An optional clear assistant test stand is available which is designed to hold small bench top testers or PROM Programmers at a convenient angle to interface with the handler's test head. These stands are available in different sizes, depending on the Tester/Programmer involved. Consult Exatron for details. These stands are designed to replace "phone book" type stands.

0.400" RAIL CONVERSION KIT

A standard 2500 Handler is equipped to handle devices of either .300" or .600" in width with the fewest adjustments possible. .400" wide devices can be handled with a minor difficulty with a .300" set up and the test head solenoids set futher apart. A changeover kit is available which converts the 2500 to handle .400" wide devices only. This will allow proper handler operation. This kit consits of:

1.) 2500-010-4 .400" Test Head Block
2.) 22 Contact Pins
3.) 2500-036-4 Tee Bar
4.) 2500-.400" Input Rail
5.) 2500-.400" Shuttle Rail

Input and output tube holders will accept any size tube from .300" to .600" without adjustement or change over.

RS232 INTERFACE

The handler could be interfaced to your tester by use of a RS-232 interface. We can supply the hardware and software to allow RS-232 interfacing. Contact the factory for details.

VIDEO TAPE TRAINING

A video tape is available for operator training. Tape may be ordered in various formats; VHS, Beta, or PRO. The tape details the handlers change over from .300" to .600" operation. Two different interfaces are installed during the tape. All of the check out procedures are also explained.

POWER CONDITIONER OPTION

Oneac Power Conditioners are available to protect your handler from the destructive effects of utility power. There are four criteria than an effective conditioner must meet. They are:

1. Reduce all noise up to the IEEE 587-1980 standard in all modes (normal and common) to levels that will ensure proper operation of the electronic system.
2. Provide a near perfect high frequency ground for semiconductors while meeting proper National Electric Code safety regulations for humans.
3. Provide a very low impedance source to properly transfer energy to modern system power supplies.
4. Match the dynamic load characteristics of an electronic system with the dynamic impedance characteristics of the line without causing oscillation or overshoot, thus remaining stable under all conditions.

Oneac's Condition One have been designed specifically to meet these criteria for effective power conditioning. Transients are reduced to levels in all modes compatible with proper system operation. A near perfect Virtual Kelvin Ground is provided that utilitzes existing building wiring, eliminating the need for dedicated grounds. The unit has extremely low impedance characteristics that ensure it will be able to drive modern power supplies while remaining stable under the dynamic conditions experienced in the field.

The benefits to the user of an effective power conditioner are many. System downtime can be reduced. Most processing errors will be eliminated, increasing operating efficiency. All this points to increased productivity and profit.

SECTION VIII

REPLACEMENT PARTS

ORDERING INFORMATION

1. All spare parts orders should be placed directly with the factory. This will speed your order and help to eliminate confusion.

2. Be able to give the serial number of the handler. The serial number will contain any revision information we need to supply you with the correct parts.

3. Be prepared to describe the part, give its location on the handler and its color.

4. If known, please use the part number.

WARRANTY REPAIRS

1. Call Exatron and describe the problem as best you can.

2. Exatron will send you the replacement part and/or assembly depending on the problem. Please return the defective part for examination.

3. In the event the handler must be returned to the factory, please use the original shipping container. Shipping the handler in any container not approved by Exatron Automatic Test Equipment may void the warranty.

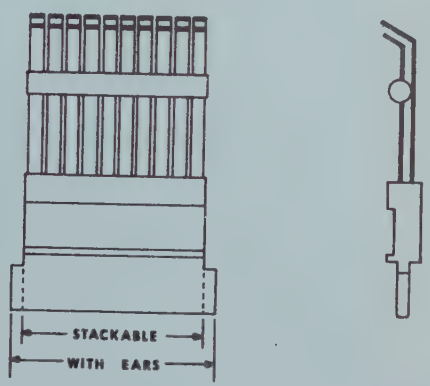
4. Warranty repairs will be completed within 48 hours and the handler will be immediately returned to you.

REPLACEMENT TEST CONTACTORS

The type of test contactors used in the Model 2500 are becoming an industry standard. They are available from several sources. The contactors can be supplied in a great variety for both standard and custom applications.

* Gold Plated Berillium Copper
* Solid Precious Metal
* Single Pin Contacts
* 10-12-15-20 Pin Molded Sets
* Stackable Types
* Snug Fit with Ears

The life of the contactors is proportional to how well you treat them. Given proper care and cleaning they should last at least one million cycles.



Description		Exatron P/N
* Single Pin	Precious Metal Contact - Stackable	CON-1-PMS
* 10 Pin	Precious Metal Contact - Stackable	CON-10-PMS
10 Pin	Gold Plated Contact - Stackable	CON-10-GPS
12 Pin	Gold Plated Contact - Stackable	CON-12-GPS
10 Pin	Gold Plated Contact - With Ears	CON-10-GPE
15 Pin	Gold Plated Contact - With Ears	CON-15-GPE
20 Pin	Gold Plated Contact - With Ears	CON-20-GPE

* Parts in Stock
Other sizes subject to availability
NOTE: Above contactors sold in matched pairs only.

SPARE CPU CARD

SPARE C.P.U. CARD-Prolong 7801-00 or 7805-0
(Cards are interchangable)

The C.P.U. card used in the handler is a standard off the shelf card available from Pro-Log. A data sheet is included for your reference, see Section XI.

Exatron adds a jumper wire to the card. If the C.P.U. is replaced this jumper must be installed on the new C.P.U. for proper operation. Use the old card as a sample of the wiring. If the C.P.U. is purchased from Exatron, the jumper will be already installed. We will also include all of the up to four E.P.R.O.M.s, programmed with the current revision of software, to run your particular handler. You can verify your E.P.R.O.M.s by using any Data I/O programmer. The sum check is written on the top of each P.R.O.M. Be sure to install all E.P.R.O.M.s in the right order and right direction.

2500 SPARE PARTS LIST

QTY	PART NUMBER AND DESCRIPTION	LOCATION
2	1N4004 DIODE	A5
4	K-6253 - OPTEK IR LED	A7
2	MV-5054-2-MONSANTO RED LED	A7
4	K-5258 - OPTEK PHOTOTRANSISTOR	A7
2	2N6386 NPN TRANSISTOR	A5
2	2N5988 PNP TRANSISTOR	A5
2	K-8720 - OPTEK REFLECTIVE IR MATCHED PAIR	A7
2	74C00 IC	A4
2	7404 IC	A4
1	7430 IC	A4
2	74LS32 IC	A4
2	74LS42 IC	A4
2	74LS175 IC	A4
2	74LS240 IC	A4
2	74LS244 IC	A4
2	74C240 IC	A4

1	UCN-4202A - SPRAQUE MOTOR CONTROL IC	A4
4	2716 2 K 5V EPROM	A4
1	7101-P3Y-CQE C & K SWITCH, 2 POS, STATIONARY	A8
1	7105-P3Y-W5QE - C & K SWITCH, 3 POS, MOMENTARY, WIRE WRAP PINS	A8
1	7101-P3Y-W5QE - C & K SWITCH, 2 POS, STATIONARY, WIRE WRAP PINS	A8
1	8121HW4E - C & K SWITCH, PUSH BUTTON, WIRE WRAP PINS	A8
1	G3385-0013A - C & H 4 POS SLIDE SWITCH	A8
2	111SM47-T2 LEVER SWITCH	A8
1	23PM-C406/20-2235D-200-E1.7 STEPPER MOTOR - SIGMA OR EQUIV.	LOOSE
1	129415-026 - LEDEX SOLENOID, MODIFIED TO #2500-106	LOOSE
1	PLUNGER - MODIFIED TO #2500-054	LOOSE
1	123423-028 LEDEX SOLENOID	LOOSE
1	PLUNGER - MODIFIED TO 2500-102	LOOSE
2	SP75-12 - ELECTRO MECHANISMS SOLENOID	LOOSE
1	PLUNGER - MODIFIED TO 2500-101-75	LOOSE
1	PLUNGER - MODIFIED TO 2500-026	LOOSE
1	SP62-12 - ELECTRO MECHANISMS SOLENOID - MODIFIED TO 2500-094-A	A6
1	PLUNGER - MODIFIED TO 2500-101-62	A6
2	MDX-2 /MDX-5 2 AMP FUZE /5 AMP FUZE AMBIENT /HOT RAIL HANDLERS HANDLER	A7
5	DVC18-2500F1-M PUSH ON TERMINALS	A1

6	02-09-2118 - MOLEX FEMALE CRIMP PINS	A1
6	02-09-1118 - MOLEX FEMALE CRIMP PINS	A1
1	BLUE PUSH BUTTON CAP #7527-7 - C & K	A8
1	YELLOW PUSH BUTTON CAP #7527-5 C & K	A8
6	PLT2M - PANDUIT CABLE TIE	LOOSE
1	609-M165TH - T&B 16 PIN DIP PLUG	A2
1	609-M145TH - T&B 14 PIN DIP PLUG	A2
1	609-M185TH - T&B 18 PIN DIP PLUG	A2
1	609-205TH - T&B 20 PIN DIP PLUG	A2
1	609-M245TH - T&B 24 PIN DIP PLUG	A2
1	609-M405TH - T&B 40 PIN DIP PLUG	A2
1	57-30240 - AMPHENOL 24 PIN CONNECTOR	LOOSE
1	2500-029 BOTTOM SHUTTLE RAIL	LOOSE
1	2500-041 INPUT BOTTOM RAIL	LOOSE
2	2500-017 TUBE BOTTOM SPRING	A12
1	LC-038-E10 STOP PIN SPRING	B14
2	SP-12 SOLENOID SPRINGS	B14
3	SMALL TEST HEAD SPRINGS 2-4	B14

1	3CCF-180-E - BOSTON MIN-E-PITCH CHAIN	A10
2	BLACK, #8-32 X 1/2 CAP SCREW	B18
2	RED, #8-32 X 1/2 CAP SCREW	B18
1	.125 - .25 ID-.375 OD - BOSTON BALL BEARING #B1-30	A9
3	#BC-13-1 T NUT 6-32 - BOSTON	A9
2	TEFLON GREEN WASHERS	B5
2	FLAT WASHER/SOLENOID 75	B5
1	FLAT WASHER/SOLENOID 62	B5
2	GRIP LATCHES #27-10-301-10 - SOUTHCO	B15
2	PH-440-1/4-N PAN HEAD BOLT NYLON	B1
2	PH-440-1/4-N FLAT HEAD BOLT NYLON	B1
2	#4 X 3/16 NYLON SPACER	B1
2	#4-40 X 1/2, NYLON STAND OFF	B1
2	#6 X 1/8 LONG NYLON SPACER	B1
2	MALE/FEMALE 1/4 STAND OFF	B16
2	MALE/FEMALE 3/8 STAND OFF	B16
2	#2-56 X 1/4 ALLEN	B10
2	#2-56 X 3/8 ALLEN	B10
2	#2-56 X 3/8 ALLEN FLAT HEAD	B12
10	#4 LOCK WASHER	B4
4	#4-40 X 3/16 PHILLIPS FLAT HEAD	B9
4	#4-40 X 1/4 PAN HEAD	B9
4	#4-40 X 1/4 ALLEN	B2
2	#4-40 X 3/8 ALLEN	B2

2	#4-40 X 3/8 ALLEN	B2
2	#4-40 X 1/2 ALLEN	B2
6	#6 SMOOTH SS WASHERS	B17
10	#6 LOCK WASHER	B4
2	#6-32 X 3/8 PAN HEAD	B9
2	#6-32 X 1/4 UNDER CUT SCOTTED FLAT HEAD	B12
7	#6-32 X 1/4 ALLEN	B3
4	#6-32 X 5/16 ALLEN HEAD	B3
6	#6-32 X 3/8 ALLEN	B3
4	#6-32 X 1/2 ALLEN	B8
4	#6-32 X 9/16 ALLEN	B8
10	#8 LOCK WASHER	B4
2	#8-32 NUT	B11
2	#8-32 X 1/4 ALLEN	B6
2	#8-32 X 3/8 ALLEN	B6
4	#8-32 X 1/2 ALLEN	B6
2	#8-32 X 3/4 ALLEN	B6
2	#10-32 X 1/2 ALLEN	B10
6"	REFLECTIVE TAPE	A3
4	2500-116-1 PADS 3/16 X 1/16	A3
4	2500-116-B PADS 3/16	A3
4	2500-116-C PADS 3/8	A3
2	2500-116-D PADS 1.625 X 1.00	A3

SECTION IX

HANDLER CHECK OUT OPTION

GENERAL DESCRIPTION

The handler check out option allows a quick and yet thorough check out of all of the handler's switches, sensors, solenoids, motor, display and I/O Port. All portions of the handler are tested separately. This allows virtually instant failure analysis.

This option is designed to be used by the operator. No technical skills are required to isolate problems. You may find that there is in fact nothing wrong with the handler. The problem may lie in some other portion of the system.

Included with the Kit:

1. One 2716 EPROM containing the special software routines used in this option is already installed in all 2500 Handlers. The Rom occupies the Rom 2 position on the CPU card.

2. An 8 sort semi-automatic simulator box. Exatron part number #2500-090.

3. A complete copy of this manual supplement.

To install the 8 sort simulator box simply connect it to the 24 pin amphenol connector on the side of the handler.

Check Out Sub Routines

1. Motor/Shuttle Location Check
2. Display Check
3. Sensor Check
4. Solenoid Check
5. Interface Check
6. Output tube switch check
7. Front Panel Check
8. Optional/Not Normally Used

To Enter Main Check Out Routine One of Two Ways
NOTE: For Data I/O PROM Programmers, enter routine "B" only.

A.

1. Push down on both the yellow STEP and yellow RETEST buttons.

2. Power up handler.

3. Handler should display = "HANDLER CHECK".

To Exit Main Check Out Routine

1. Will Exit back to the beginning of the handler's MANUAL or AUTO cycle.

2. When ever the handler displays = "HANDLER CHECK".

3. Push the blue RUN botton.

1. Motor/Shuttle Location Check

A. With the handler displaying = "HANDLER CHECK".

B. Push SORT 1 button on simulator box.

C. Display = "SHUTTLE CHECK"

D. With the motor switch ON.

E. Push up on the TOTAL switch, the shuttle should move one tube to the left. Display = "ONE LEFT STEP"

F. Push up on the UP COUNT switch the shuttle should move one tube to the right. Display = "ONE RIGHT STEP"

G. Push down on the FLUSH switch, the shuttle should move two tubes to the left. Display = "TWO LEFT STEP"

H. Push down on the COUNT DOWN switch, the shuttle should move two tubes to the right. Display = "TWO RIGHT STEP"

I. Push the yellow STEP button to exit sub routine.

2. Display Check

A. With the handler displaying = "HANDLER CHECK".

B. Push the SORT 2 button on the simulator box.

C. The display will pulse between 16 asteric's * and 16 "0"'s.

D. All of the 5 red L.E.D.'s on the door should blink on and off.

E. Be sure all segments on all 16 display characters blink on/off.

F. Push yellow STEP button to exit routine.

3. Sensor Check

A. With the handler displaying = "HANDLER CHECK".

B. Push the SORT 3 botton on the simulator box.

C. Display = "Sensor 1 2 3 4 5 6 7 8". Note: Not all 1 thru 8 may be displayed.

D. If handler is empty and the shuttle is correctly centered then only sensor "6" should be displayed.

E. Each number, 1 thru 8, relates to a photo sensor.

1	Bin 1
2	Bin 2
3	Bin 3
4	Bin 4
5	Bin 5
6	Shuttle Home (Between 2 and 3)
7	Test Site Sensor
8	Input Sensor (Top of Rail)

F. If a number is displayed then that sensor is blocked or is not functioning.

G. Open and close the door, the sensors should all turn off and on, Note: Sensor 6 may be blocked by the shuttle, move the shuttle to check sensor 6.

H. To exit routine, push yellow STEP button.

4. Solenoid Check

A. With the handler displaying = "HANDLER CHECK"

B. Push the SORT 4 button on the simulator box.

C. The stack solenoid should turn off/on four times. Display = "STACK SOLENOID"

D. The index solenoid should turn off/on four times. Display = "INDEX SOLENOID"

E. Both test head solenoids should turn off/on four times. Display = "2 TEST HEAD SOLENOID"

F. The stop solenoid should turn off/on four times. Display = "STOP SOLENOID"

G. The shuttle solenoid should turn off/on four times. Display = "SHUTTLE SOLENOID"

H. The cycle shoud repeat itself.

I. To exit routine at anytime push the yellow STEP button.

5. **Interface Check**

A. With the handler displaying = "HANDLER CHECK".

B. Push the SORT 5 button on the simulator box.

C. Display = "INTERFACE CHECK"

D. Push the SORT 1 button on the simulator box. The display should show = "TESTER SORT 1".

E. Push the yellow RETEST button. Display = "INTERFACE CHECK"

F. Repeat steps D. and E. for all 8 SORT buttons. Each should display correct SORT number.

G. To exit the routine, push the yellow STEP button.

6. **Output Tube Switch Check**

A. With the handler displaying = "HANDLER CHECK"

B. Push the SORT 6 push button on the simulator box.

C. Display = "TUBE SWITCH CHECK"

D. Push down on all five of the output tube switches.

E. The red L.E.D. over each bin should turn on when its corresponding switch is closed.

F. To exit routine push yellow STEP Button.

7. **Front Panel Check**

A. With the handler displaying = "HANDLER CHECK"

B. Push the SORT 7 button on the simulator box.

C. Display = "FRONT PANEL CHECK"

D. Each switch should be pushed or held up or down, one at a time.

E. Each switch will have its name displayed while that switch is closed.

F. Check all switches.

G. Note: There is no computer check for the motor switch. This switch will have to be tested using the shuttle location check.

H. To exit the routine, push the yellow STEP button.

8. **Optional Check**

A. This check for custom applications, not normally used.

OR

B.

1. Power up handler.

2. Put the handler in the AUTO mode.

3. With the display showing "READY TO RUN" or "EMPTY OR JAM" .

4. Push down on both the yellow STEP and yellow RETEST buttons.

5. Switch to MANUAL without letting go of the yellow buttons.

6. Handler should display = "HANDLER CHECK".

THE FOLLOWING DOES NOT APPLY TO HANDLERS USING THE RS-232 INTERFACE

Instructions for Simulator Use

1. The 8 sort simulator box can be used to run the handler in a semi-automatic mode. (EXCEPTION-Model 2500 set up for Data I/O Programmer interface does not include this feature.)

2. The simulator acts as if it were a tester connected to the handler. This can be used to help debug interface problems and train the operator.

3. With the handler in either RUN or MANUAL mode, the handler will issue a start pulse whenever the test contactors are closed. This pulse will cause the red L.E.D. labled "START" on the simulator to light. The handler should be displaying = "TEST IN PROCESS"

4. The test contactors will remain closed until the handler receives a SORT signal.

5. Press the desired SORT button on the simulator to bin the device.

6. If the handler is in the RUN mode a new cycle will be started. Press the desired SORT button after each time the red start L.E.D. lights.

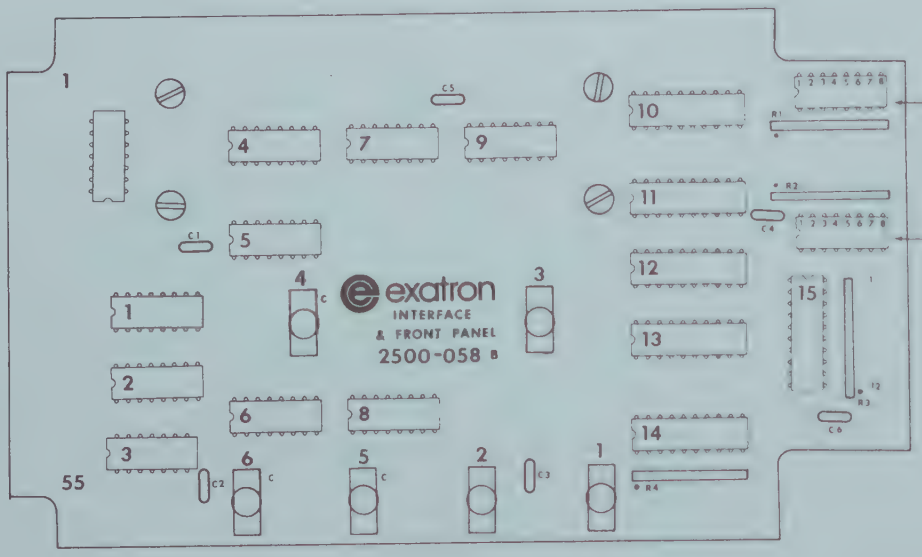
7. Note: The handler will go in an error mode if you press a SORT button for which there is no corresponding BIN or BINS. See the error message section of the main manual.

SECTION X

SCHEMATICS

PRINT #	DESCRIPTION	PAGE
2500-058	INTERFACE AND FRONT PANEL ASSEMBLY SCHEMATIC	10-1
2500-059	SOLENOID AND SENSOR I/O ASSEMBLY SCHEMATIC	10-3
2500-062	DOOR SOLENOIDS ASSEMBLY SCHEMATICS	10-5
2500-063	DOOR DISPLAYS AND SENSORS ASSEMBLY SCHEMATICS	10-7
2500-064	L.E.D. BOARD (OUTPUT SENSORS) ASSEMBLY SCHEMATICS	10-9
2500-065	TUBE SWITCH ASSEMBLY SCHEMATIC	10-11
2500-066	BUS BOARD ASSEMBLY SCHEMATIC	10-13
2500-068	MOTOR CONTROL ASSEMBLY	10-15
2500-068	STEPPER MOTOR CARD ASSEMBLY	10-16
2500-0105B	POWER SUPPLY SCHEMATIC	10-17

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV



QPM1	2500
QPM1	2400
QPM1	2300
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
ANGLES ± 1°
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01

INTERPRET THIS DWG PER USA STANDARDS

MAT'L
P.L.

SIGNATURE AND DATE	
DRWN	7-9-82
APVD	

FINISH
ASSEMBLY

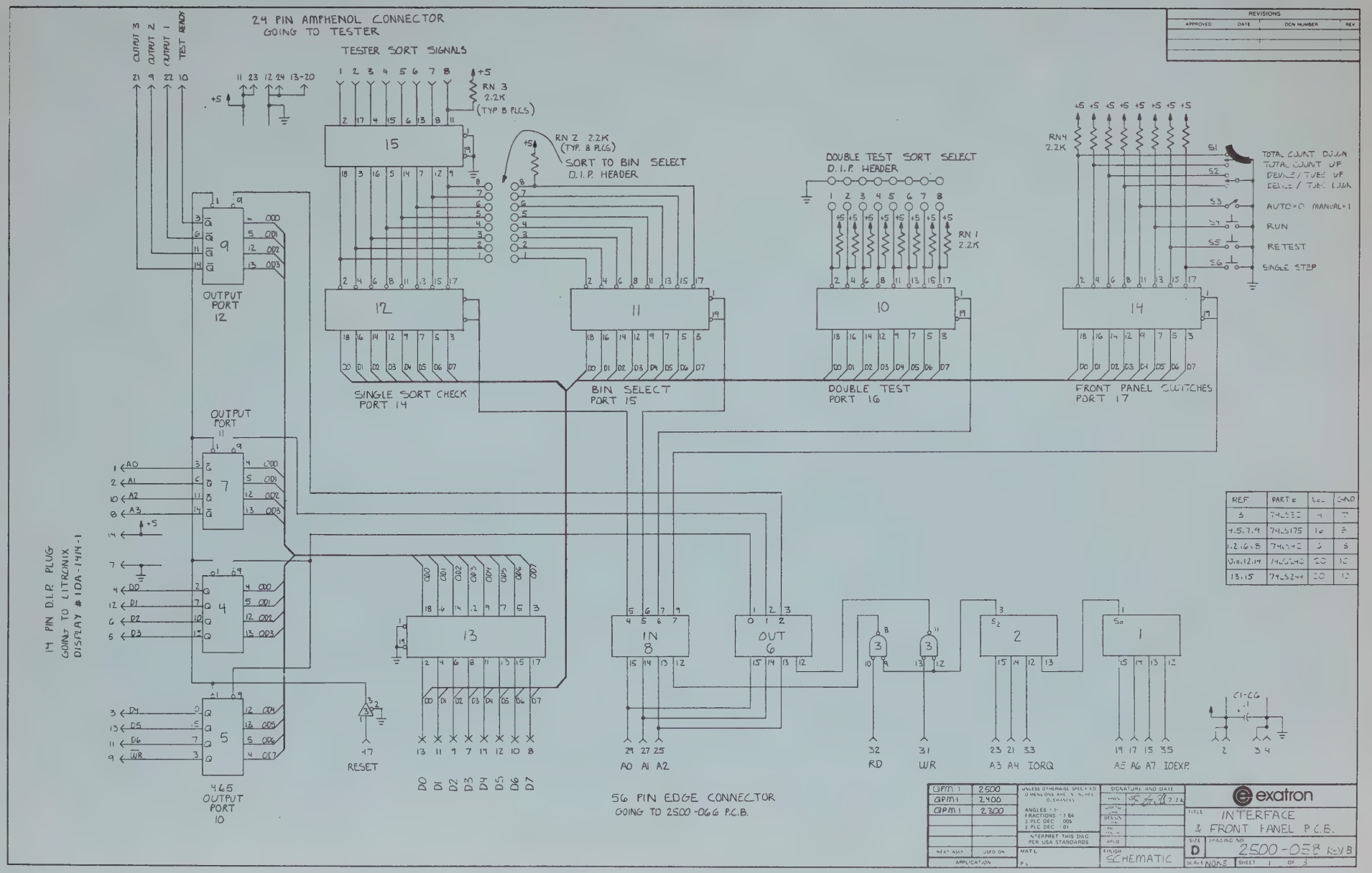
exatron

TITLE
INTERFACE & FRONT PANEL

SIZE	DRAWING NO	REV
B	2500-058	B

SCALE 1,1 SHEET 2 OF 3

BAY REPROGRAPHICS



REF	PART #	VCC	GND
3	74LS32	14	7
4,5,7,9	74LS175	16	8
1,2,16,18	74LS42	5	8
10,11,12,14	74LS240	20	10
13,15	74LS244	20	10

REVISIONS

APPROVED	DATE	DCN NUMBER	REV

GPM 1	2500
GPM 1	2400
GPM 1	2300

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES
ANGLES ± 1°
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01
INTERPRET THIS DWG PER USA STANDARDS
MATL
FINISH
SCHEMATIC
NEXT ASSY | USED ON | APPLICATION
SIGNATURE AND DATE
DRAWN
CHECKED
ENG
MFG
QA

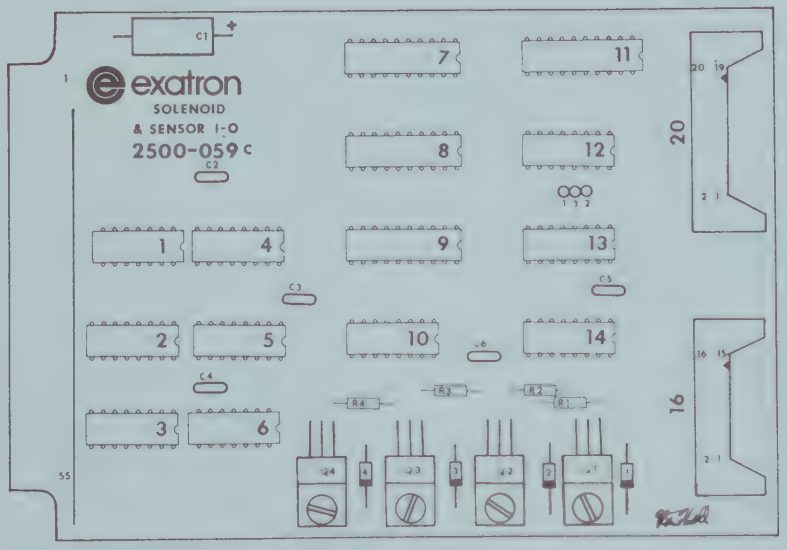
exatron

TITLE: INTERFACE & FRONT PANEL P.C.B.

SIZE: D | DRAWING NO: 2500-058 REV B

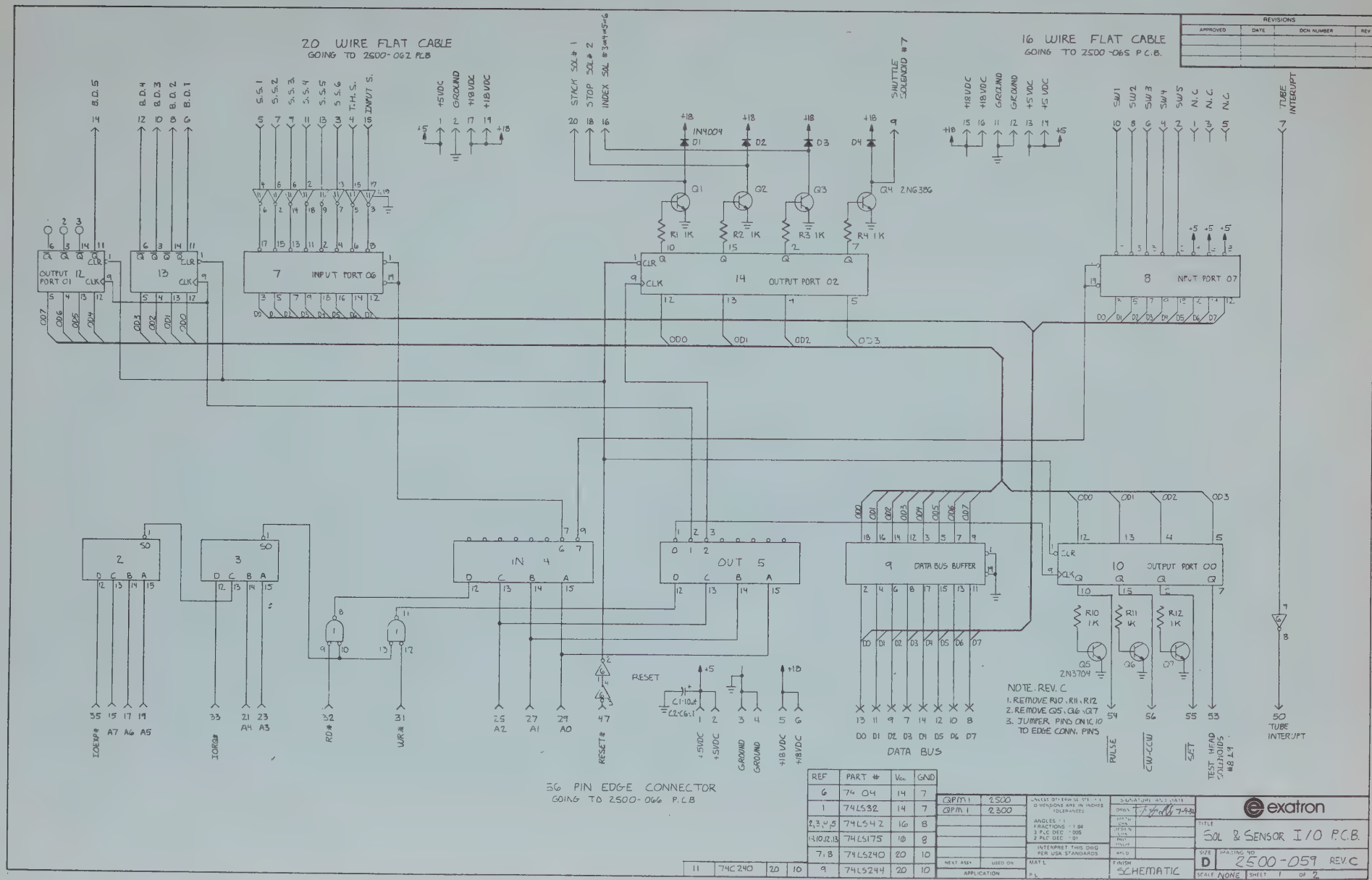
SCALE: NONE | SHEET 1 OF 3

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

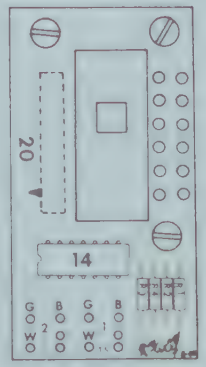


QTY	2500	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± .005 2 PLC DEC ± .01	SIGNATURE AND DATE DRWN 7-13-82 CHK'D DESIGN PROJ. MGR. APVD	exatron TITLE: SOL & SENSOR I/O P.C.B.
QPM 1	2300			
				SIZE B DRAWING NO 2500-059 REV. C
		INTERPRET THIS DWG PER USA STANDARDS		SCALE 1:1 SHEET 2 OF 3
NEXT ASSY	USED ON	MAT'L	FINISH	
APPLICATION		PL	ASSEMBLY	

BAY REPROGRAPHICS


20 WIRE FLAT CABLE
GOING TO 2500-062 PCB
16 WIRE FLAT CABLE
GOING TO 2500-065 P.C.B.
REVISIONS
APPROVED
DATE
DCN NUMBER
REV
B.D.5
B.D.4
B.D.3
B.D.2
B.D.1
S.S.1
S.S.2
S.S.3
S.S.4
S.S.5
S.S.6
T.H.S.
INPUT S.
+5VDC
GROUND
+18VDC
+18 VDC
STACK SOL # 1
STOP SOL # 2
INDEX SOL #3 #4 #5 #6
SHUTTLE SOLENOID #7
IN4004
D1
D2
D3
D4
Q1
Q2
Q3
Q4 2NG386
R1 1K
R2 1K
R3 1K
R4 1K
SW1
SW2
SW3
SW4
SW5
N.C.
TUBE INTERUPT
OUTPUT PORT 01
INPUT PORT 06
OUTPUT PORT 02
INPUT PORT 07
OD0
OD1
OD2
OD3
OD4
OD5
OD6
OD7
IN 4
OUT 5
DATA BUS BUFFER
OUTPUT PORT 00
R10 1K
R11 1K
R12 1K
Q5 2N3704
Q6
Q7
RESET
C1:10uf
C2:6:1
NOTE. REV. C
1. REMOVE R10, R11, R12
2. REMOVE Q5, Q6, Q7
3. JUMPER PINS ON IC 10 TO EDGE CONN. PINS
DATA BUS
PULSE
CW-CCW
SET
TEST HEAD SOLENOIDS #8 #9
TUBE INTERUPT
IOEW#
A7 A6 A5
IOR#
A4 A3
RD#
WR#
RESET#
A2
A1
A0
+5VDC
+5VDC
GROUND
GROUND
+18 VDC
+18VDC
36 PIN EDGE CONNECTOR
GOING TO 2500-066 P.C.B
REF
PART #
Vcc
GND
6
74 04
14
7
1
74LS32
14
7
2,3,4,5
74LS42
16
8
10,11,12,13
74LS175
16
8
7,8
74LS240
20
10
9
74LS244
20
10
11
74C240
20
10
QPM 1
2.500
QPM 1
2.300
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES
ANGLES ± 1
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01
INTERPRET THIS DWG PER USA STANDARDS
MATL
FINISH
SCHEMATIC
NEXT ASSY
USED ON
APPLICATION
exatron
TITLE
SOL & SENSOR I/O P.C.B.
SIZE
D
DRAWING NO
2500-059
REV C
SCALE NONE
SHEET 1 OF 2

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV



RPM	2500
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

ANGLES ± 1
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01

INTERPRET THIS DWG PER USA STANDARDS

MATL
P L

SIGNATURE AND DATE

FINISH
ASSEMBLY

exatron

TITLE
DOOR SOLENOID P.C.B.

SIZE	DRAWING NO	REV
B	2500-062	C

SCALE :

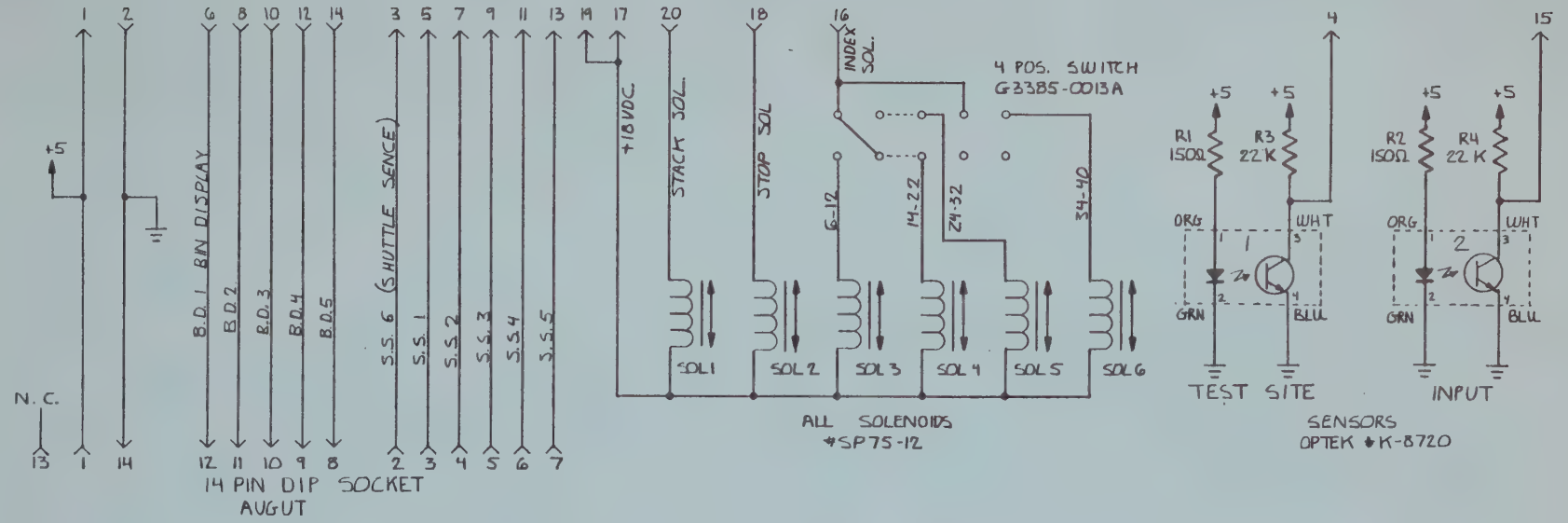
SHEET 2 OF 3

HAV REPROGRAPHICS

REVISIONS			
APPROVED	DATE	NUMBER	REV

20 WIRE FLAT CABLE
GOING TO 2500-059 P.C.B.

20 PIN HEADER TAB #609-2027ES



14 WIRE FLAT CABLE
GOING TO #2500-063 P.C.B.

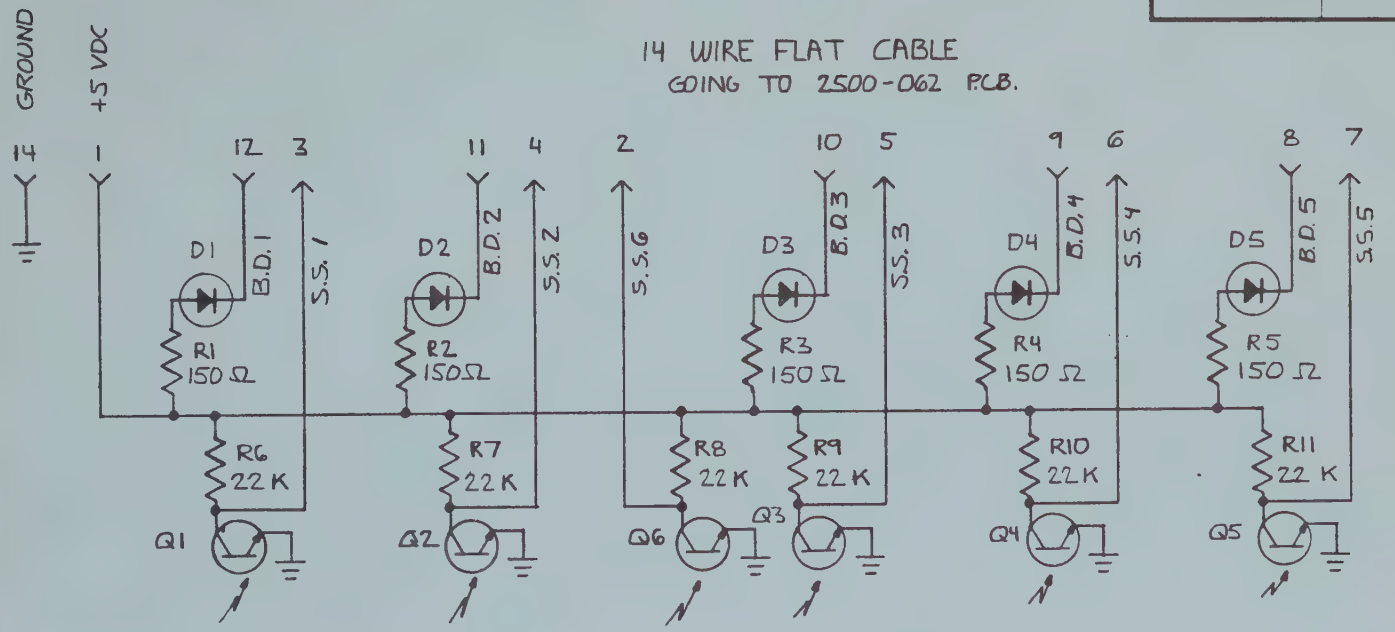
QPM 1	2500	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ±1° FRACTIONS ±1/64 3 PLC DEC ±.005 2 PLC DEC ±.01	SIGNATURE AND DATE	exatron	
			DRWN 9-8-82	TITLE	DOOR SOLENOIDS P.C.B.
			DRFTG CHK		
			DESIGN CHK		
		INTERPRET THIS DWG PER USA STANDARDS	PROJ MNGR		
			APVD	SIZE C	DRAWING NO 2500-062 REV. C
NEXT ASSY	USED ON	MAT'L	FINISH SCHEMATIC	SCALE NONE	SHEET 1 OF 3
APPLICATION		P/L			

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

JFM	2500	UNLESS OTHERWISE SPECIFIED TOLERANCES ANGLES ° ' FRACTIONS ± 1/64 3 PL DEC ± .005 2 PL DEC ± .01 INTERPRET THIS DWG PER MIL STANDARDS	SIGNATURE AND DATE DRWN 7-13-92 CHK DESIGN PROJ MFG	exatron TITLE DOOR DISPLAY SENSOR P. C. B.
				SIZE B DRAWING NO 2500-063 REV. B
NEXT ASSY	USED ON	MAT'L P L	FINISH ASSEMBLY	SCALE 1:1 SHEET 2 OF 3
APPLICATION				

BAY REPROGRAPHICS

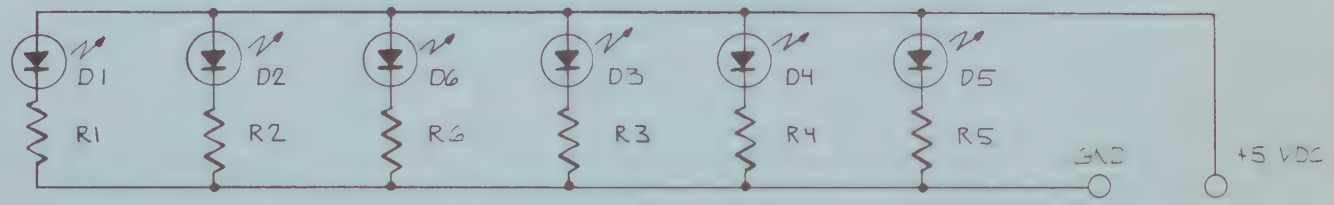
REVISIONS			
APPROVED	DATE	DCN NUMBER	REV



D1-D5	L.E.D. - RED	MV-5054-2
Q1-Q5	PHOTO TRANSISTOR	K-5258
R1-R5	RESISTOR 1/4 W 5%	150 Ω
R6-R11	RESISTOR 1/4 W 5%	10 K
NOT SHOWN -	14 PIN AUGUT SOCKET	

QPM 1		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± .005 2 PLC DEC ± .01	SIGNATURE AND DATE	exatron	
			DRWN	TITLE	
			DRFTG CHK	DOOR DISPLAYS - SENSORS P.C.B.	
			DESIGN CHK		
			PROJ MNGR		
		INTERPRET THIS DWG PER USA STANDARDS	APVD	SIZE B	DRAWING NO 2500-063 REV. B
NEXT ASSY	USED ON	MAT'L.	FINISH SCHEMATIC	SCALE NONE	SHEET 1 OF 2
APPLICATION		P L			

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV



2 WIRES
GOING TO 2500-065 P.C.B.
22 AWG -STRANDED -TEFLON

D1- D6 INFRARED L.E.D. K-6253
R1 -R6 RESISTOR 1/4 W 5% 220 Ω

QPM1		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± 005 2 PLC DEC ± 01 INTERPRET THIS DWG PER USA STANDARDS	SIGNATURE AND DATE DRWN 7-6-82 DRFTG CHK DES'N CHK PROJ MNGR APVD	exatron	
NEXT ASSY	USED ON	MAT'L	FINISH	TITLE	
APPLICATION		P L	SCHEMATIC	L.E.D. BOARD	
				SIZE B	DRAWING NO 2500-064 REV. A.
				SCALE NONE	SHEET 1 OF 2

BAY REPROGRAPHICS

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

GPM 1	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES

ANGLES ± 1°
FRACTIONS ± 1/64
3 PLC DEC ± 005
2 PLC DEC ± 01

INTERPRET THIS DWG PER USA STANDARDS

MAT'L

P/L.

SIGNATURE AND DATE	
DRWN	7-13-82
DRFTG CHK	
DESIGN CHK	
PROJ MNGR	
APVD	

FINISH ASSEMBLY

exatron

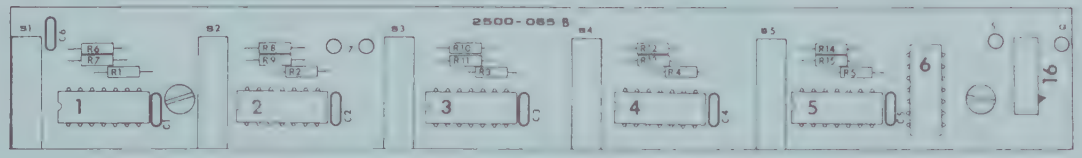
TITLE L.E.D. BOARD

SIZE B | DRAWING NO. 2500-064 REV. A

SCALE 1:1 | SHEET 2 OF 3

BAY REPROGRAPHICS

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

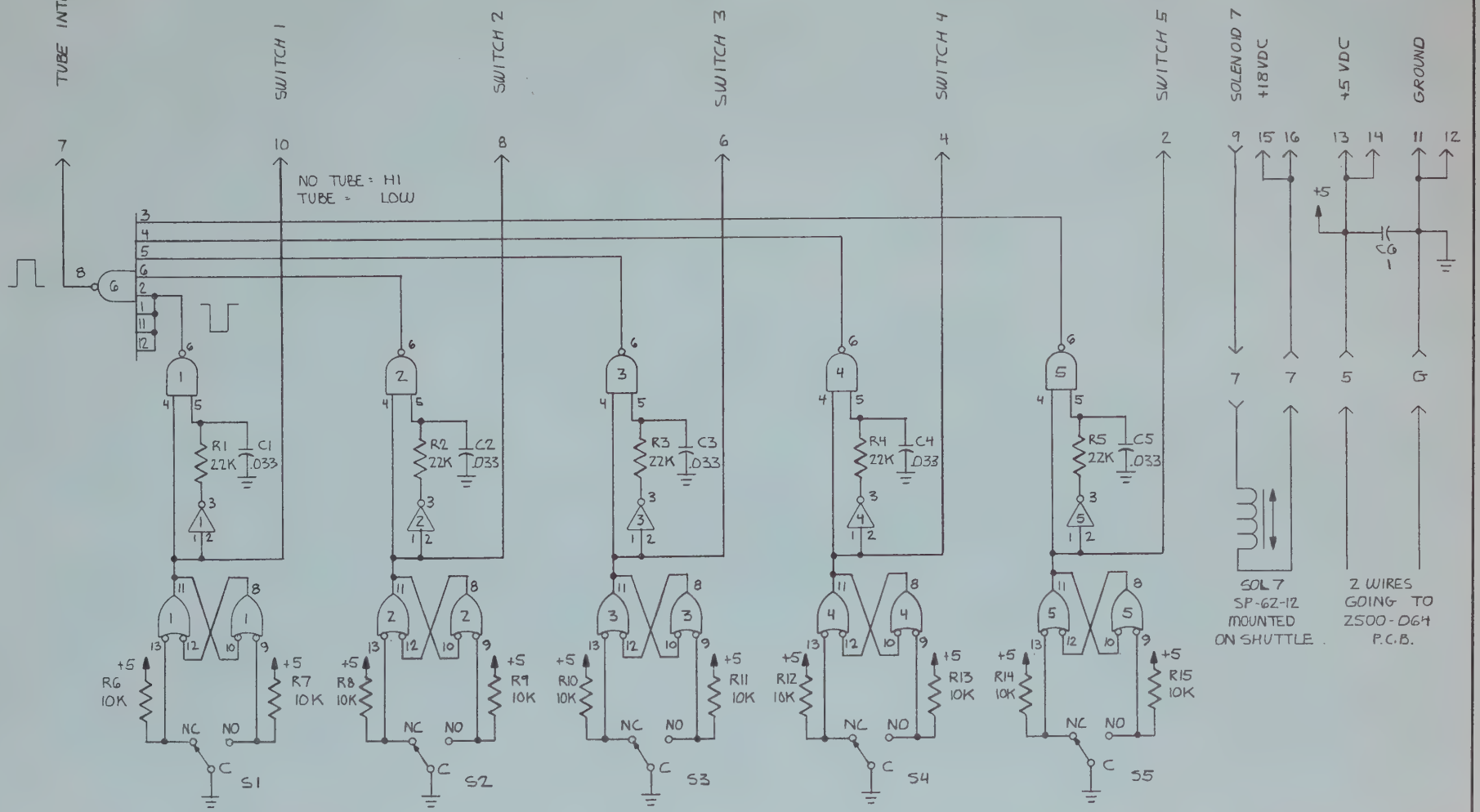


QPM1	2500	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± .005 2 PLC DEC ± .01	SIGNATURE AND DATE DRWN 7-13-82 CHK'D CHK DESIGN CHK PROJ MNGR APVD	exatron	
QPM1	2300			TITLE: TUBE SWITCH BOARD	
		INTERPRET THIS DWG PER USA STANDARDS		SIZE: B	DRAWING NO: 2500-065 REV. B
NEXT ASSY	USED ON	MAT'L: P L	FINISH: ASSEMBLY	SCALE: 1:1	SHEET 2 OF 3
APPLICATION					

BAY REPROGRAPHICS

REVISION			
APPROVED	DATE	NUMBER	REV

16 WIRE FLAT CABLE
GOING TO 2500-059 P.C.B.



MICRO SWITCH
1115M47-TZ
(5 PLCS)

REF.	PART #	V_{cc}	GND
1-5	7400	14	7
6	7430	14	7

QPM 1		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± 1° FRACTIONS ± 1/64 3 PLC DEC ± .005 2 PLC DEC ± .01 INTERPRET THIS DWG PER USA STANDARDS	SIGNATURE AND DATE DRWN 7-8-82 DRFTG CHK DESIGN CHK PROJ MNGR APVD
NEXT ASSY	USED ON	MAT'L	FINISH SCHEMATIC
APPLICATION		P/L	

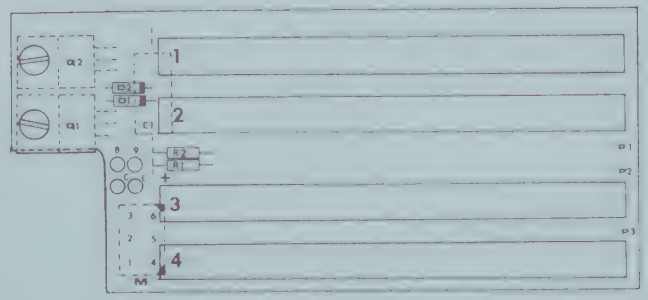
exatron

TITLE: TUBE SWITCH BOARD

SIZE C | DRAWING NO 2500-065 REV. B

SCALE NONE | SHEET 1 OF 2

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV



QPM1	2500
QPM1	2400
QPM1	2300
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES

ANGLES ± 1
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01

INTERPRET THIS DWG PER USA STANDARDS

MAT'L
P/L

SIGNATURE AND DATE

DRWN	7-13-92
CHK	
DESIGN CHK	
PROJ. MNGR	
APVD	

FINISH
ASSEMBLY

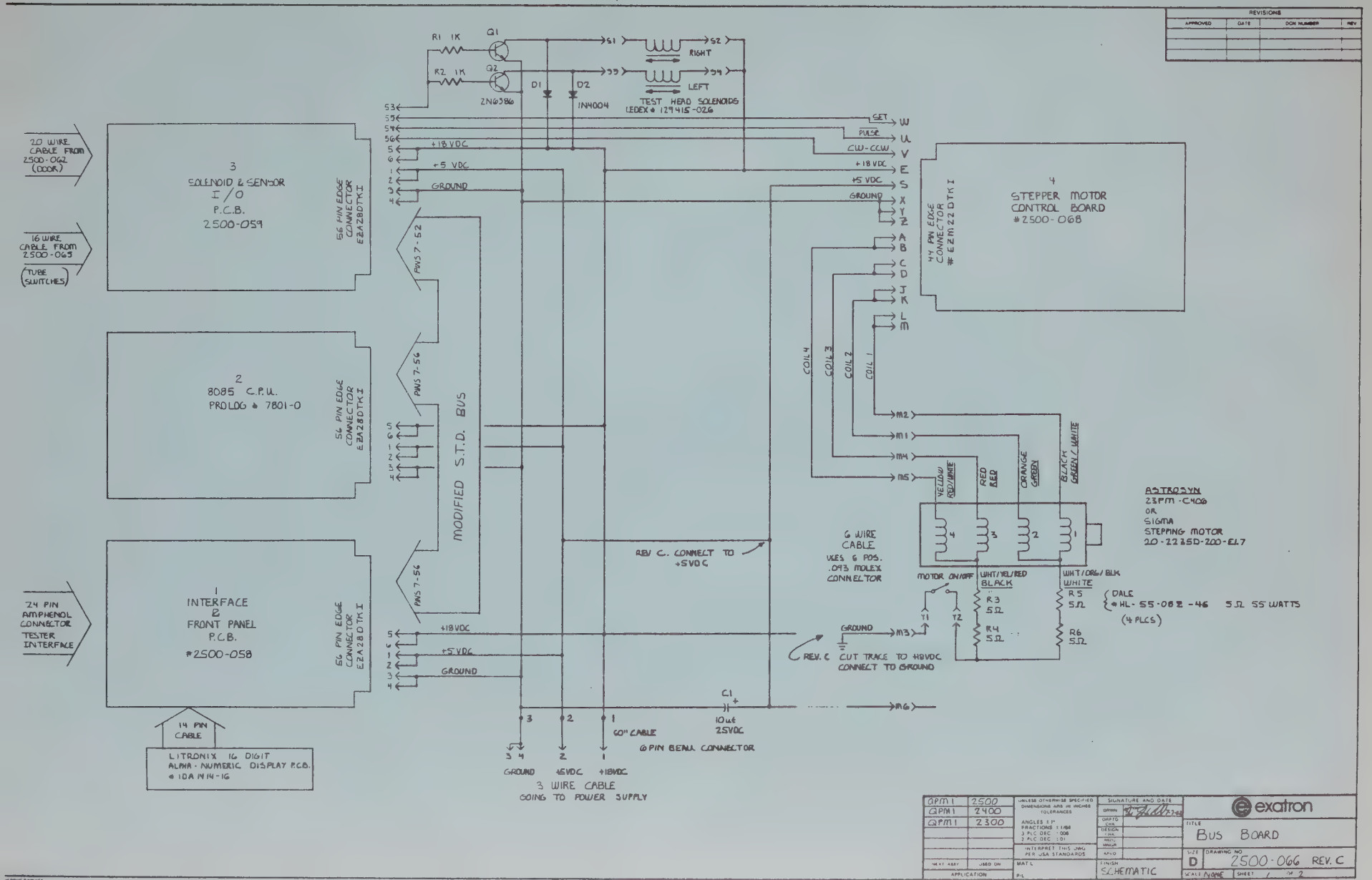
exatron

TITLE
BUS BOARD

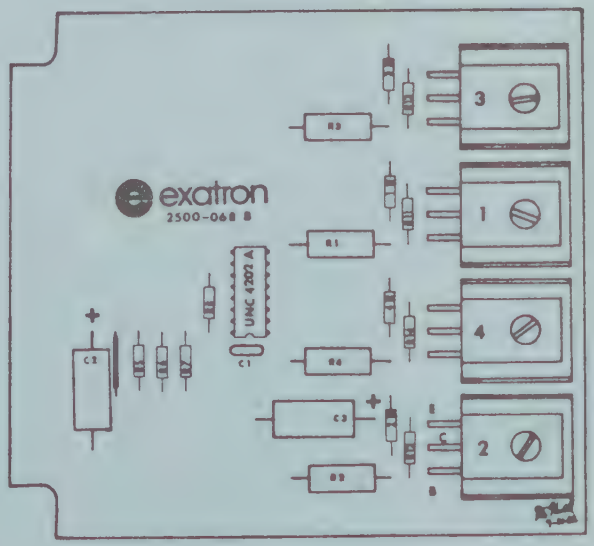
SIZE	DRAWING NO
B	2500-066 REV C

SCALE 1:1 SHEET 2 OF 3

BAY REPROGRAPHICS


REVISIONS
APPROVED
DATE
DCN NUMBER
REV
20 WIRE CABLE FROM 2500-062 (DOOR)
16 WIRE CABLE FROM 2500-063 (TUBE SWITCHES)
24 PIN AMPHENOL CONNECTOR TESTER INTERFACE
3 SOLENOID & SENSOR I/O P.C.B. 2500-059
2 8085 C.P.U. PROLOG # 7801-0
1 INTERFACE & FRONT PANEL P.C.B. #2500-058
56 PIN EDGE CONNECTOR E2A28DTKI
PWS 7-52
PWS 7-56
MODIFIED S.T.D. BUS
14 PIN CABLE
LITRONIX 16 DIGIT ALPHA-NUMERIC DISPLAY P.C.B. # IDA 1414-16
R1 1K
R2 1K
Q1
Q2
ZN6386
D1
D2
1N4004
S1
S2
S3
S4
RIGHT
LEFT
TEST HEAD SOLENOIDS LEDEX # 129415-026
+18 VDC
+5 VDC
GROUND
SET
PULSE
CW-CCW
4 STEPPER MOTOR CONTROL BOARD #2500-068
44 PIN EDGE CONNECTOR # E2M22DTKI
COIL 4
COIL 3
COIL 2
COIL 1
YELLOW RED/WHITE
RED RED
ORANGE GREEN
BLACK GREEN/WHITE
ASTROSYN 23PM-C408 OR SIGMA STEPPING MOTOR 20-2235D-200-EL7
6 WIRE CABLE USES 6 POS. .093 MOLEX CONNECTOR
REV. C. CONNECT TO +5VDC
MOTOR ON/OFF
WHT/YEL/RED BLACK
WHT/ORG/BLK WHITE
R3 5Ω
R4 5Ω
R5 5Ω
R6 5Ω
DALE # HL-55-08E-46 5Ω 55 WATTS (4 PLCS)
REV. C CUT TRACE TO +18VDC CONNECT TO GROUND
C1 10uf 25VDC
60" CABLE
6 PIN BERG CONNECTOR
3 WIRE CABLE GOING TO POWER SUPPLY
GROUND
+5VDC
+18VDC
QPM1 2500
QPM1 2400
QPM1 2300
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES
ANGLES ± 1°
FRACTIONS ± 1/64
2 PLC DEC ± .008
3 PLC DEC ± .01
INTERPRET THIS DWG PER USA STANDARDS
MATL
FINISH
SCHEMATIC
SIGNATURE AND DATE
exatron
TITLE
BUS BOARD
SIZE D
DRAWING NO 2500-066 REV. C
SCALE NONE
SHEET 1 OF 2

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV



QPM 1	2500
QPM 1	2400
QPM 1	2300
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES

ANGLES ± 1°
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01

INTERPRET THIS DWG
PER USA STANDARDS

MAT'L
P.L

SIGNATURE AND DATE

DRWN	9-23-86
CHK'D	
DESIGN CHK	
PROJ. MNGR	
APVD	

FINISH
ASSEMBLY

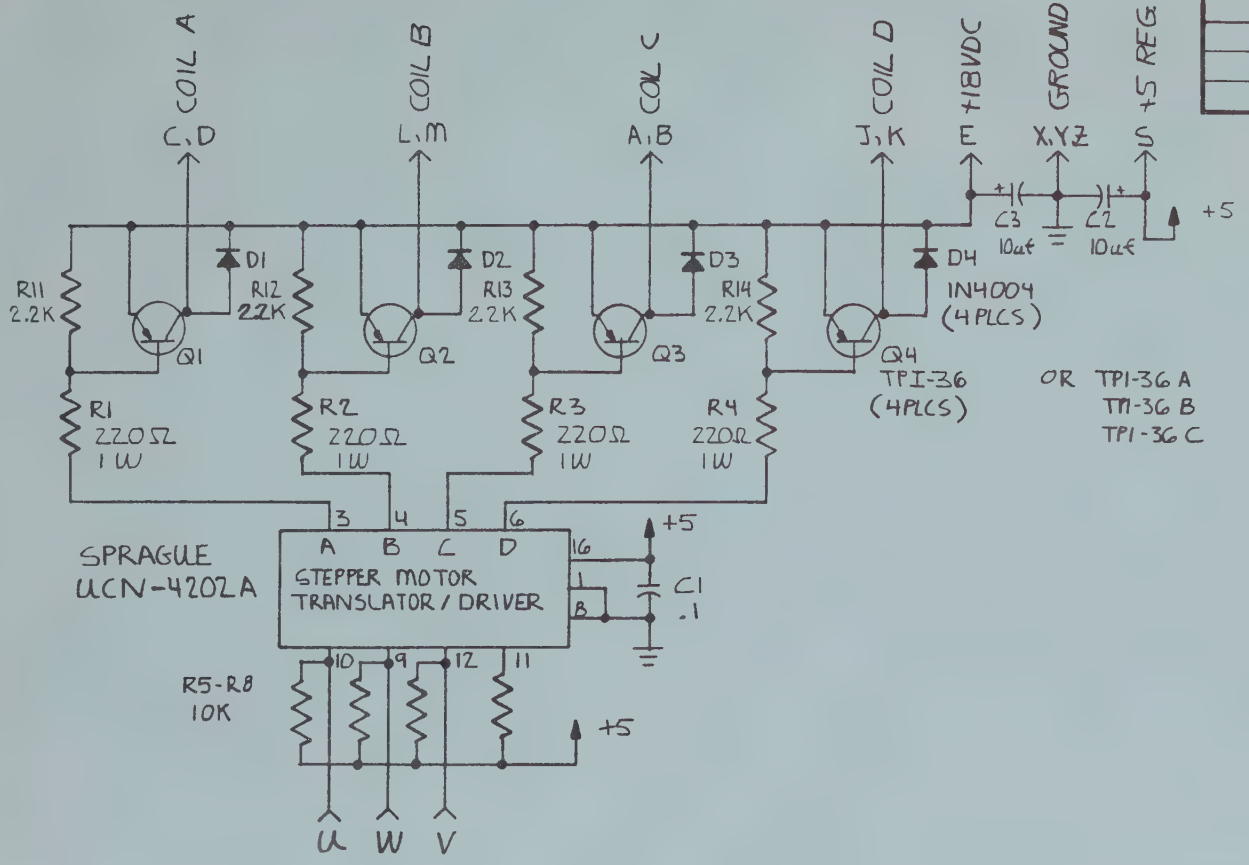
exatron

TITLE
MOTOR CONTROL

SIZE B | DRAWING NO 2500-068 REV. B

SCALE 1:1 | SHEET 2 OF 3

MAY REPROGRAPHICS



REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

QPM1	2500
QPM1	2400
QPM1	2300
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES

ANGLES ± 1°
FRACTIONS ± 1/64
3 PLC DEC ± .005
2 PLC DEC ± .01

INTERPRET THIS DWG PER USA STANDARDS

MAT'L

P/L

SIGNATURE AND DATE	
DRWN	9-18-82
DRFTG CHK	
DESIGN CHK	
PROJ MNGR	
APVD	

FINISH
SCHEMATIC

exatron

TITLE
STEPPER MOTOR CARD

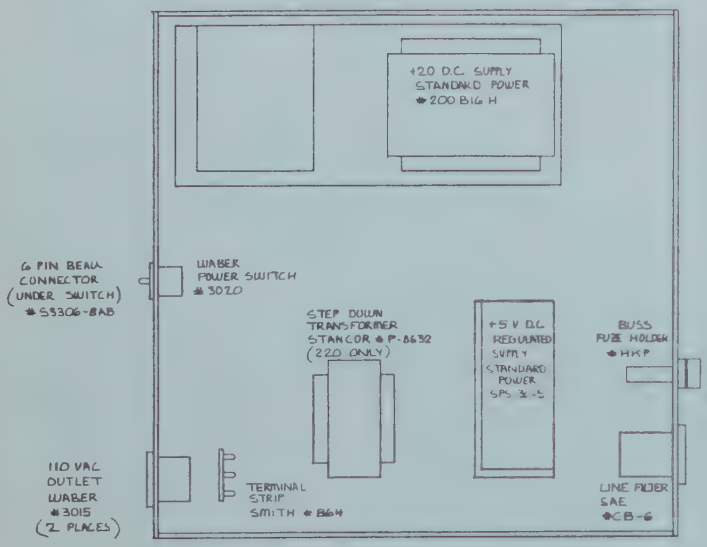
SIZE B | DRAWING NO 2500-068 REV. B

SCALE NONE | SHEET 1 OF 3

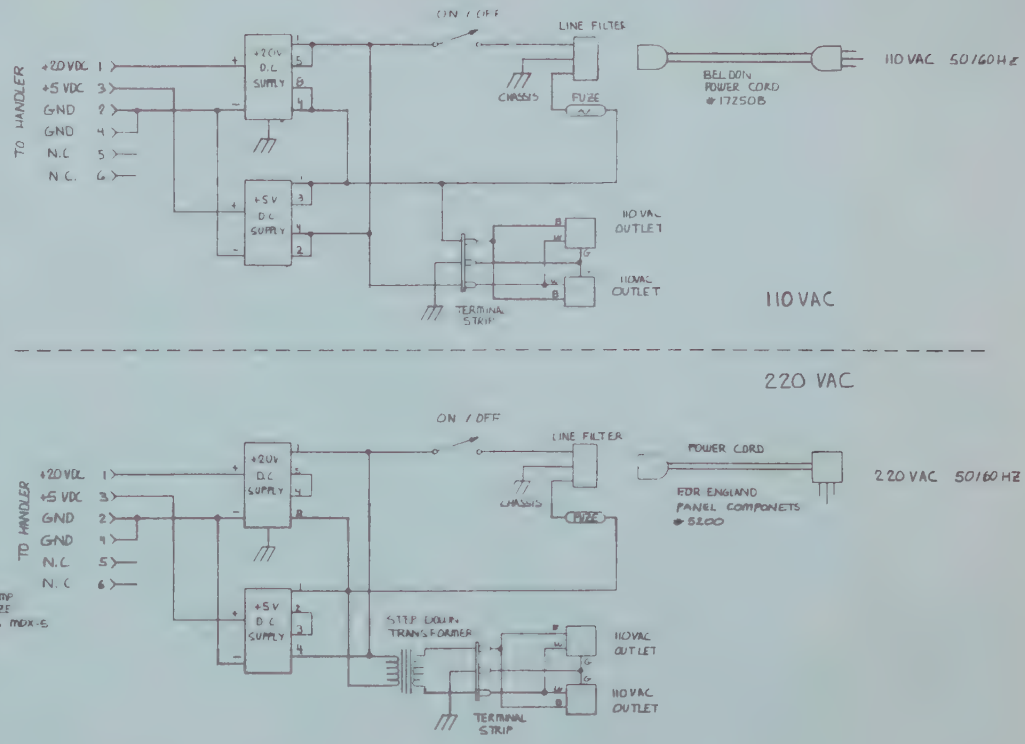
BAY REPROGRAPHICS

REVISIONS			
APPROVED	DATE	DCN NUMBER	REV

NOTE: 20 VOLT SUPPLY HAS AN INTERNAL OUTPUT FUZE

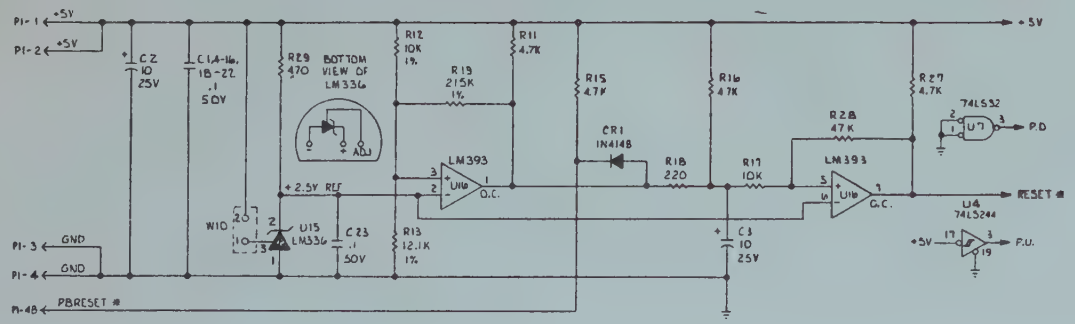

+20 D.C. SUPPLY STANDARD POWER #200 B16 H
6 PIN BEAU CONNECTOR (UNDER SWITCH) #S3306-8AB
WABER POWER SWITCH #3020
STEP DOWN TRANSFORMER STANCOR #P-8632 (220 ONLY)
+5 V D.C. REGULATED SUPPLY STANDARD POWER SPS 3-5
BUSS FUZE HOLDER #HKP
5 AMP FUZE BUSS MDX-5
110 VAC OUTLET WABER #3015 (2 PLACES)
TERMINAL STRIP SMITH #B64
LINE FILTER SAE #CB-6

INSIDE OF POWER SUPPLY



GPM 1	2500	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES FRACTIONS ± 64 3 PL DEC ± .005 2 PL DEC ± .01 INTERPRET THIS DWG PER USA STANDARDS	SIGNATURE AND DATE	exatron
				TITLE: POWER SUPPLY
				SIZE: D DRAWING NO: 2500-105 B
NEXT ASSY	USED ON	MAT'L	FINISH: SCHEMATIC	SCALE: NONE SHEET 1 OF 1
APPLICATION				

REVISIONS			
DOC REV	DESCRIPTION	DATE	APPR
A	INITIAL RELEASE PCN 2141	12-22-82	C.WALL



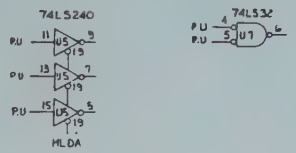
NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTORS ARE IN OHMS, ¼W, 5%.
2. ALL RESISTOR PACKS ARE 4.7K, 1W, 5%,
3. ALL CAPACITOR VALUES ARE IN MICROFARADS
4. FOR 7805-0 USE 6.250 MHZ CRYSTAL.
   FOR 7805-1 USE 6.144 MHZ CRYSTAL.

REFERENCE DESIGNATION	
LAST USED	* NOT USED
C23	
CR1	
J1	
R32	
U21	
W10	
Y1	
P1	

DEVICE TABLE			
REF DES.	DEVICE TYPE	POWER PINS GND	POWER PINS +5V
U8	74LS00	7	14
U11	74LS30	7	14
U7	74LS32	7	14
U9,10	74LS138	8	16
U5,6	74LS240	10	20
U2,3,4	74LS244	10	20
U1	74LS245	10	20
U17	74LS373	10	20
U15	LM336	—	—
U16	LM393	4	8
U14	8085A	20	40
U18-U21	27:6	12	24
U12,U13	2K x 8 RAM	12	24
R1-8,22, 24-26,30-32	R PACKS	—	1

SIGNAL LOCATOR CHART		
SIGNAL NAME	SHEET / ZONE LOCATION SOURCE	SHEET / ZONE LOCATION DESTINATION
ALE	S2/C5	S2/A4
HLDA	S2/B5	S2/D7, S1/A8
INTA #	S2/B5	S2/A2
IN/OUT #	S2/A1	S2/D8
EXT CLK	S2/C7	S2/B8
RESET #	S1/D4	S2/B7
CRD #	S2/B5	S2/A2
P.D	S1/D4	S2/B7, S2/B2, S2/C2 S2/C5, S2/B4
P.U.	S1/D4	S2/A2, S2/A4

SPARE GATES



ITEM NO	QTY	DESCRIPTION
		PARTS LIST

UNLESS OTHERWISE SPECIFIED
1. DIMENSIONS ARE IN INCHES
2. BREAK ALL SHARP EDGES
3. DO NOT SCALE DRAWING.
4. TOLERANCES: N/A
ANGLES ± —
.XX ± —
.XXX ± —

PRO-LOG CORPORATION

DRAWN — DATE —
CHECK E.G.D. DATE —
APPR — DATE —
SCALE —

TITLE: SCHEMATIC, 7805, 8085A CPU CARD

SIZE D | DOC NO 109613 | REV A | SH 1 OF 2

SECTION XI

DATA SHEETS

1. PROLOG 7801-1 8085A PROCESSOR CARD
2. SIEMENS/LITRONIX IDA-1414-16-1 INTELLIGENT DISPLAY
3. STANDARD POWER SPS-30-5, 5V REGULATED POWER SUPPLY
4. STANDARD POWER 200B16, 18.5V UNREGULATED POWER SUPPLY
5. BOSTON GEAR CHAIN SPECIFICATION

7801, PROCESSOR CARD

FUNCTIONAL

- Executes all of the 8080 and 8085A processor instructions
- Crystal oscillator produces 320 ns (7801) or 325.5+ns (7801-1) ±0.05% time states optional, external clock input range 1 to 6 MHz, 25% to 50% duty cycle (card operates at ½ input frequency).
- DIP socket access to SID and SOD (Serial input/output data) and interrupts 5.5, 6.5, 7.5.
- Power-on reset and PBRESET* one-shot hold SYSRESET* active for 50 ms maximum.
- Sockets are provided for up to four +5V type 2716 EPROMs (8192 bytes total), which occupy HEX memory addresses 0000-1FFF (8K) as shipped.
- Jumper pads are provided for disabling the on-board memory or remapping it from HEX memory addresses 0000-2FFF (12K) to C000-EFFF (12K). If any onboard memory is used, external memory cards may not be mapped in HEX memory address 0000-3FFF (16K), or C000-FFFF (16K) if onboard remapping option is used.
- Power-on reset: 50 ms maximum after VCC reaches +4.75V; requires monotonic rise of VCC from 0.5V to +4.75V in 10 ms or less.
- Push-button reset: 50 ms maximum duration after release of push-button.

ELECTRICAL

- VCC = +5V ±5%
- ICC = 1.4A maximum (1.0 typical) with EPROM and RAM sockets fully loaded (100 mA per EPROM and 65 mA per RAM maximum).
- Address, data, and control buses meet STD BUS general electrical specifications except:
  WAITRQ* - Input loading 14 LSTTL loads max.
  PBRESET* - Input capacitance 1.0μF nominal.
  MEMEX, IOEXP - These bus lines are grounded on the 7801 by user-removable traces.
  CLOCK* - Output drives 10 LSTTL loads.
- A 16-pin DIP socket is provided for access to the serial I/O lines and three additional interrupts. The interrupts and Serial Input Data (SID) each present 4 LSTTL loads, and Serial Output Data (SOD) can drive 60 LSTTL loads.

MECHANICAL

- Meets all STD BUS general mechanical specifications.
- May require one additional card slot width if ribbon cable access to J1 is used.
- Socket J1 mates with 16-pin DIP plug such as T & B Ansley Catalog Number 609-M165H or equivalent.

J1 SERIAL I/O INTERRUPT PIN LIST						
PIN NUMBER	SIGNAL FLOW	SIGNAL		PIN NUMBER	SIGNAL FLOW	SIGNAL
INTR 7.5*	IN	1		16	OUT	GND
INTR 6.5*	IN	2		15	OUT	GND
INTR 5.5*	IN	3		14	OUT	GND
SOD*	OUT	4		13	OUT	GND
SID*	IN	5		12	OUT	GND
(SPARE)		6		11	OUT	GND
(SPARE)		7		10	OUT	GND
(SPARE)		8		9	OUT	GND

* Active low-level logic

J1 SERIAL I/O INTERRUPT PIN LIST

STD 7801 EDGE CONNECTOR PIN LIST							
PIN NUMBER	OUTPUT (DRIVE) / INPUT (LOADING)			PIN NUMBER	OUTPUT (DRIVE) / INPUT (LOADING)		
MNEMONIC							MNEMONIC
+5V	VCC		2	1		VCC	+5V
GROUND	GND		4	3		GND	GROUND
-5V			6	5			-5V
D7	5	50	8	7	50	5	D3
D6	5	50	10	9	50	5	D2
D5	5	50	12	11	50	5	D1
D4	5	50	14	13	50	5	D0
A15	5	50	16	15	50	5	A7
A14	5	50	18	17	50	5	A6
A13	5	50	20	19	50	5	A5
A12	5	50	22	21	50	5	A4
A11	5	50	24	23	50	5	A3
A10	5	50	26	25	50	5	A2
A9	5	50	28	27	50	5	A1
A8	5	50	30	29	50	5	A0
RD*	5	50	32	31	50	5	WR*
MEMRQ*	5	50	34	33	50	5	IORQ*
MEMEX (GROUND)		OUT	36	35	OUT		IOEXP (GROUND
MCSYNC* (ALE*)	5	50	38	37			REFRESH*
STATUS 0* (S0*)	5	50	40	39	50	5	STATUS 1* (S1*
BUSRQ*	5		42	41	50	5	BUSAK*
INTRQ*	5		44	43	50	5	INTAK*
NMIRQ*	5		46	45		14	WAITRQ*
PBRESET*	1 μF		48	47	50		SYSRESET*
CNTRL*			50	49	10		CLOCK*
PCI	IN		52	51	OUT		PCO
AUX GND			54	53			AUX GND
AUX -V			56	55			AUX -V

* Active low-level logic

Edge Connector Pin List

ORDERING INFORMATION

7801-0 — 6.250 MHz Crystal
7801-1 — 6.144 MHz Crystal

USER'S MANUAL

To obtain the user's manual for the 7801, ask for Pro-Log document #106903. Also, see data sheet for M825 system analyzer.

SIEMENS

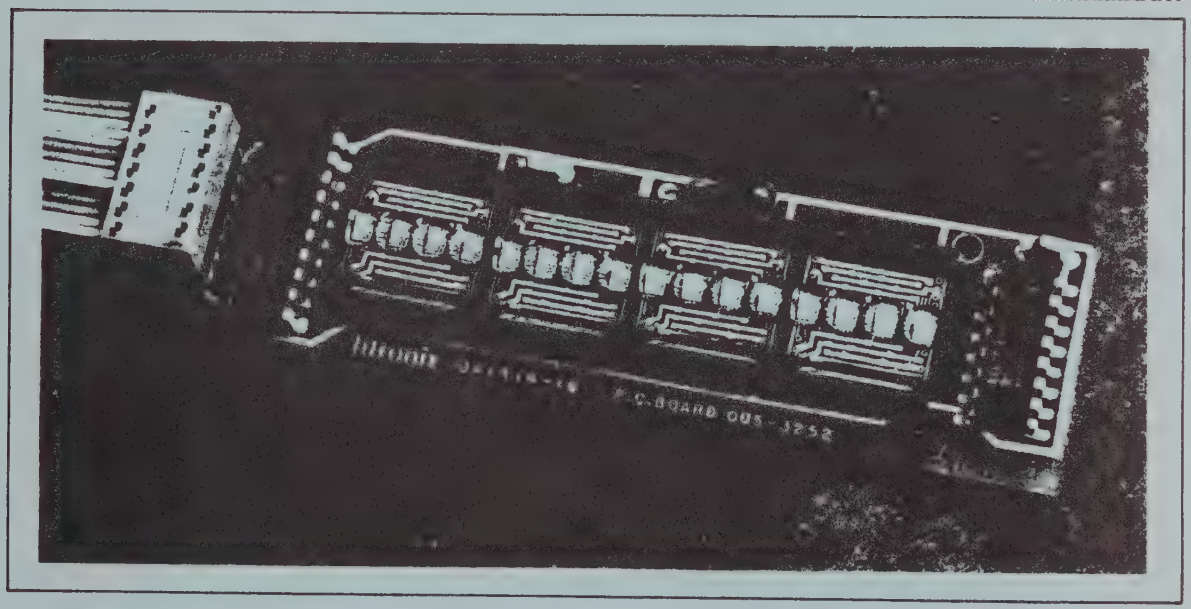
IDA-1414-16

.112″ Red, 17 Segment, 16 Character DL-1414 Intelligent Display™ ASSEMBLY

IDA-1414-16-1 Input Data Lines are Buffered
IDA-1416-16-2 Input Data Lines are Not Buffered

A Litronix Division Product

PRELIMINARY



FEATURES

- 112 Mil High, Magnified Monolithic Character
- Wide Viewing Angle, ± 40°
- Complete Alphanumeric Display Assembly Utilizing the DL-1414
  - Built-in Multiplex and LED Drive Circuitry
  - Built-in Memory
  - Built-in Character Generator
- Displays 64 Character ASCII Set
- Direct Access to Each Digit Independently
- Single 5.0 Volt Power Supply
- TTL Compatible
- Easily Interfaced to a Microprocessor
- IDA-1414-1 Input Data Lines Are Buffered
- IDA-1414-2 Input Lines Are Not Buffered

DESCRIPTION

The IDA-1414-16 Assembly is an extension of the very easy-to-use DL-1414 Intelligent Display™. This product provides the designer with circuitry for display maintenance. It also minimizes interaction and interface normally required between the user's system and a multiplexed alphanumeric display.

The assembly consists of four DL-1414's in a single row, together with decoder and interface buffer on a single printed circuit board. Each DL-1414 provides its own memory, ASCII ROM character decoder, multiplexing circuitry, and drivers for its four 17- segment LED's.

Intelligent Display Assemblies can be used for applications such as data terminals, controllers, instruments, and other products which require an easy to use alpha-numeric display.

System Overview

The Intelligent Display Assembly offers the designer 16 alphanumeric characters and operates from just a 5V supply. Based on the previously introduced Litronix DL-1414 four character intelligent display, the IDA 1414-16 adds all the support logic required for direct connection to most microprocessor buses. The system interface takes place through a 14 hole dual in line pattern. The user may solder wires directly into these holes or use a ribbon cable and connectors.

System Power Requirements

Operating from a single +5V power supply, the IDA-1414-16 requires a maximum operating current of 400 mA with ten of the segments lit on each character. With the display blanked, the board circuitry draws 75 mA maximum.

Display Interface

The display interface available on the 14 pin dual in line hole pattern consists of seven data lines (DØ to D6), four address lines (A0 to A3), write pulse, V_{CC}, and Gnd.

$\overline{WR}$ (Write, active low): To store a character in the display memory, this line must be pulsed low for a minimum of 425 ns. See timing diagram for timing and relationships to other signals.

Address lines AØ to A3 are set up so that the right-most character is the lowest address. The left-most character is the highest address. Data lines are set up so that DØ is the least significant bit and D6 is the most significant bit.

Using the Display Interface

Through the use of memory-mapped I/O techniques, the IDA can be treated almost like a memory location—supply the data, address and proper control signals and the characters appear, with each character location independently addressable. The basic signal flow sequence to load a character would start with the address lines going to the desired address. After the address has stabilized, the data can change to the desired values. After the data have stabilized, the $\overline{WR}$ pulse is started, and must remain low for at least 425 ns. Signals must be held stable for 150 ns, minimum, after the rising edge of the $\overline{WR}$ pulse to ensure correct loading, while the addresses must be stable for 575 ns preceding the same rising edge of the $\overline{WR}$ pulse. See the timing diagram for a pictorial explanation.

System Design Considerations

It is often necessary, because of the nature of displays, to use ribbon cable from the CPU board. We have provided a 14 pin dual-in-line hole pattern for this purpose. In those circumstances for cables over 12 inches, use IDA 1414-16-1 (buffered version) instead of IDA 1414-16-2 (non-buffered version). Voltage transients from noisy systems may couple through the cables into the Intelligent Display and can cause serious damage.

Avoid handling the assembly other than by the edges of the PCB. Static damage can still be a problem, so take the necessary precautions. Keep in conductive material, grounded work areas, etc.

The IDA 1414 assemblies should need minimal cleaning. A gentle wiping with a soft damp cloth should be its only requirement. The solvent that cannot be used on any Intelligent Display product is alcohol. Therefore, if a solvent is used, first check chemical composition before application.

CHARACTER SET

				D0	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H
				D1	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H
				D2	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H
				D3	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
D6	D5	D4	HEX		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
L	H	L	2			!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
L	H	H	3		0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
H	L	L	4		@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
H	L	H	5		P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_

STANDARD POWER Inc

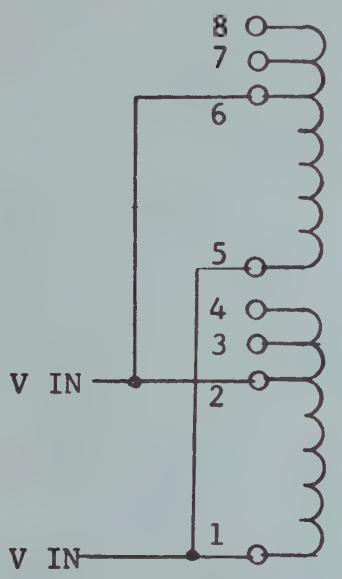
A Subsidiary of

Acme Electric Corporation

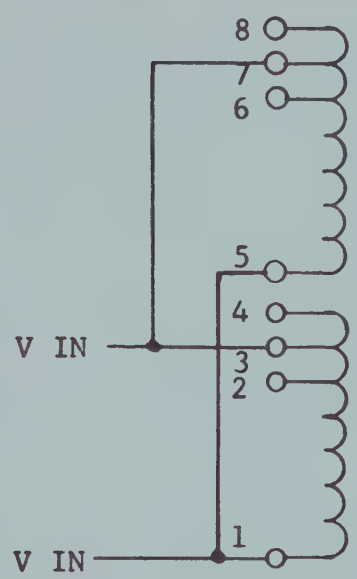
TRANSFORMER CONNECTIONS FOR RECONNECTABLE MODEL H UNREGULATED UNITS

115V CONNECTION

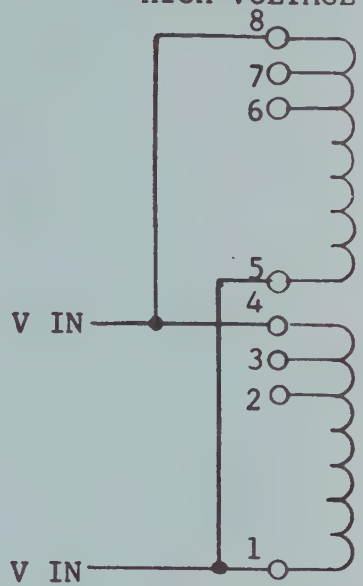
LOW VOLTAGE



NOMINAL VOLTAGE

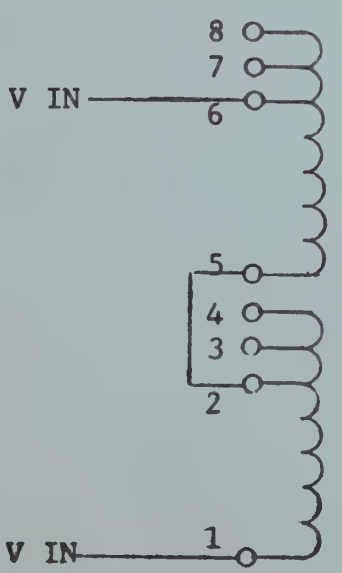


HIGH VOLTAGE

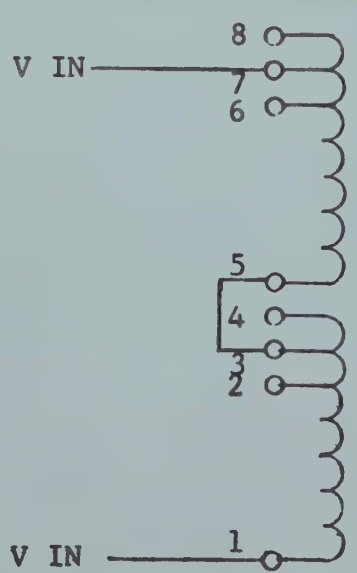


230V CONNECTION

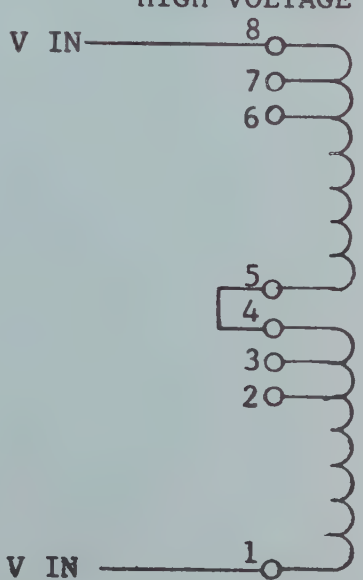
LOW VOLTAGE



NOMINAL VOLTAGE



HIGH VOLTAGE



STANDARD POWER, INCORPORATED ■ 1400 South Village Way ■ Santa Ana, Calif. 92705 ■ phone (714) 558-8512

STANDARD POWER Inc

A Subsidiary of

Acme Electric Corporation

BLACK LINE POWER SUPPLY SERIES
OPERATING INSTRUCTIONS

DESCRIPTION

The Standard Power Black Line consists of a series of economical, unregulated power supplies. A broad combination of voltages and currents has been chosen to fill a variety of DC power requirements. The output is floating and may be referenced to another low voltage, common, ground, or placed in series with another DC voltage.

OPERATING PROCEDURE

Input: Connect 115 Vac, 50/60Hz to terminals 1 and 3 of transformer. Taps 1 and 2 will give a higher output voltage for the same load, and taps 1 and 4 will give a lower output voltage.

Output: Connections are made to the terminals on the large filter capacitor. Terminals are aligned vertically with the positive terminal above the negative terminal.

Caution: Replace fuse with standard 3 AG at same rating.

The appropriate nominal voltage versus load and maximum current for each model in the Black Line is given below.

Model	Vdc	Amps	Typical Full Load Voltage Output For Taps 1 & 2	1 & 3	1 & 4	Typical MV RMS Ripple	3 AG Fuse Amps
15B7	7	1.8	9.0	7.5	6.5	300	3.0 A
15B12	12	1.2	12.5	11.0	10.0	350	1.5 A
15B16	16	0.9	20.0	17.0	14.5	145	1.5 A
15B20	20	0.75	23.5	19.8	18.0	490	1.5 A
15B24	24	0.6	28.0	25.0	22.5	350	1.5 A
15B48	48	0.3	56.0	48.0	46.5	350	1.0 A
15B100/120	100/120	0.12	105/127	94/113	85/102 *	700	0.25 A
15B230/250	230/250	0.05	255/274	230/246	212/227 *	1000	0.25 A
30B7	7	3.0	8.5	7.5	6.5	250	5.0 A
30B12	12	2.4	13.5	12.0	10.5	275	4.0 A
30B16	16	1.8	18.5	16.0	14.5	142	4.0 A
30B20	20	1.5	23.0	19.8	18.0	260	4.0 A
30B24	24	1.2	29.5	26.5	24.0	200	3.0 A
30B48	48	0.6	53.0	48.0	43.0	150	1.5 A
30B100/120	100/120	0.25	114/137	99/118	89/107	1000	1.0 A
30B230/250	230/250	0.10	246/270	226/247	208/227 *	1400	0.75 A
60B7	7	6.0	9.4	8.4	7.6	300	10.0 A
60B12	12	4.4	13.4	12.0	10.8	300	7.0 A
60B16	16	3.6	19.4	17.4	15.7	300	6.0 A
60B20	20	3.0	23.3	20.7	18.7	400	5.0 A
60B24	24	2.2	28.2	25.4	23.0	300	4.0 A
60B48	48	1.2	53.2	48.0	43.2	300	2.0 A
100B7	7	10.0	10.0	8.5	7.5	275	15.0 A
100B12	12	7.0	13.5	12.5	11.5	300	15.0 A
100B16	16	6.0	20.0	17.0	16.0	260	10.0 A
100B20	20	5.0	23.0	19.4	18.0	285	10.0 A
100B24	24	3.5	28.0	25.5	23.0	200	10.0 A
100B48	48	1.8	52.5	48.0	43.5	200	7.0 A
200B7	7	20.0	10.0	9.0	7.5	275	25.0 A
200B12	12	15.0	13.5	12.5	11.5	400	25.0 A
200B16	16	12.5	18.5	16.5	15.0	260	20.0 A
200B20	20	10.0	22.0	20.0	18.0	230	15.0 A
200B24	24	7.5	28.0	25.5	24.0	375	15.0 A
200B48	48	4.0	51.0	47.0	43.0	250	10.0 A

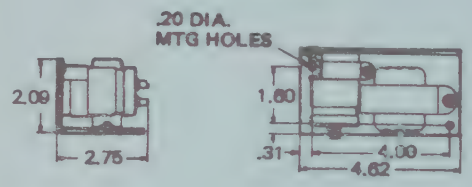
* For higher voltage output use transformer secondary connection 5 and 7
(Factory connection, unless order specifies lower voltage)

* For lower voltage output use transformer secondary connection 5 and 6
(More rectifier lead from transformer terminal 7 to terminal 6)

Continuous Duty 50°C Ambient

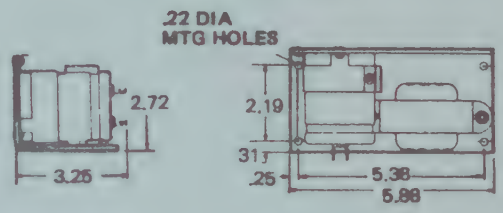
15B SERIES
30B SERIES
60B SERIES
100B SERIES
200B SERIES

15B SERIES



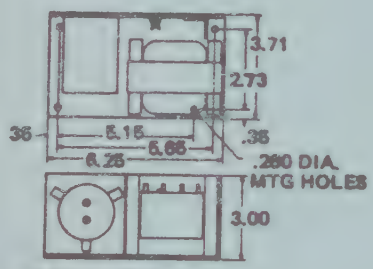
Weight: 1.7 lbs.

30B SERIES



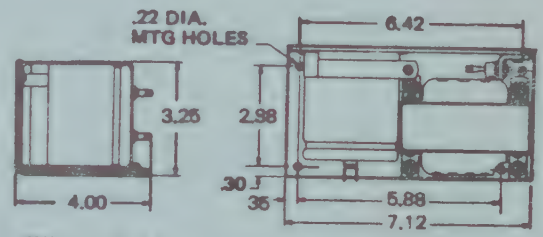
Weight: 2.8 lbs.

60B SERIES



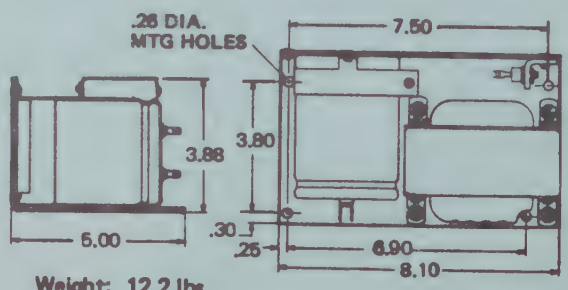
Weight: 4.0 lbs.

100B SERIES



Weight: 6.7 lbs.

200B SERIES



Weight: 12.2 lbs.

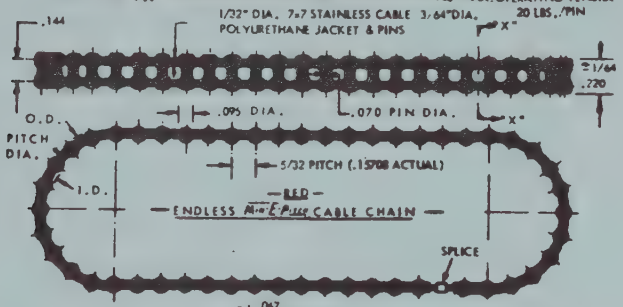
All Dimensions in Inches

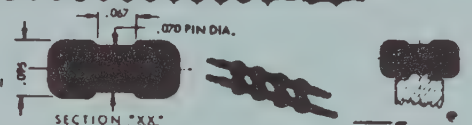
4 m m & .15708 ACTUAL PITCH

MIN·E·PITCH CHAIN

ENDLESS (SPLICED)

A FACTOR OF Pi (π) PATENTED 140# MAX. OPERATING TENSILE





ZERO BACKLASH
•SILENT CHAIN
•NO LUBRICATION
•POSITIVE DRIVE

SECTION "XX"

WEIGHT .13 OZ./FT.

20 PITCHES = Pi (π) 3.1416, • 40 PITCHES = 2 (π) ETC.

Min-E-Pitch CABLE CHAIN

STOCK NUMBER	RETAIL PRICE	NO. PITCHES	CIR. AT PITCH DIA.
3CCF-30-E	$ 2.36	30	4.712
3CCF-35-E	2.58	35	5.498
3CCF-40-E	2.80	40	6.283
3CCF-45-E	3.02	45	7.068
3CCF-50-E	3.24	50	7.854
3CCF-55-E	3.45	55	8.639
3CCF-60-E	3.67	60	9.424
3CCF-70-E	4.11	70	10.995
3CCF-80-E	4.55	80	12.566
3CCF-90-E	4.98	90	14.137
3CCF-100-E	5.42	100	15.708
3CCF-110-E	5.86	110	17.278
3CCF-120-E	6.29	120	18.849
3CCF-130-E	6.73	130	20.420
3CCF-140-E	7.17	140	21.991
3CCF-150-E	7.61	150	23.562
3CCF-160-E	8.04	160	25.132
3CCF-170-E	8.48	170	26.703
3CCF-180-E	8.92	180	28.274
3CCF-190-E	9.35	190	29.845
3CCF-200-E	9.76	200	31.416

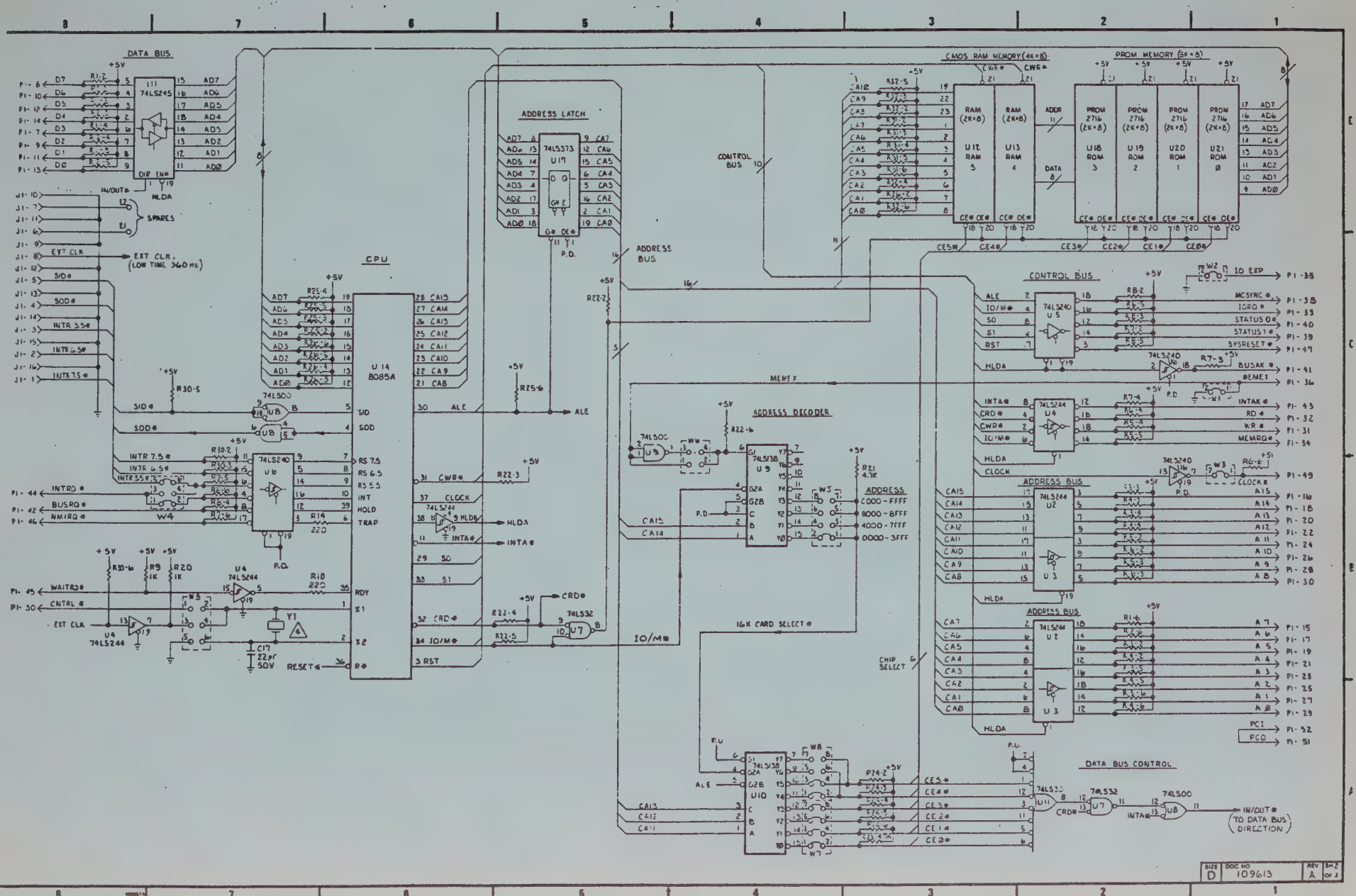
STOCK NUMBER	RETAIL PRICE	NO. PITCHES	CIR. AT PITCH DIA.
3CCF-210-E	$ 10.23	210	32.986
3CCF-220-E	10.66	220	34.557
3CCF-230-E	11.10	230	36.128
3CCF-240-E	11.54	240	37.699
3CCF-250-E	11.98	250	39.270
3CCF-260-E	12.41	260	40.840
3CCF-270-E	12.85	270	42.411
3CCF-280-E	13.29	280	43.982
3CCF-290-E	13.72	290	45.553
3CCF-300-E	14.16	300	47.124
3CCF-310-E	14.60	310	48.694
3CCF-320-E	15.03	320	50.265
3CCF-330-E	15.47	330	51.836
3CCF-340-E	15.91	340	53.407
3CCF-350-E	16.35	350	54.978
3CCF-360-E	16.78	360	56.548
3CCF-370-E	17.22	370	58.119
3CCF-380-E	17.66	380	59.690
3CCF-400-E	18.53	400	62.832
3CCF-420-E	19.40	420	65.973
3CCF-440-E	20.28	440	69.115

SPECIAL LENGTHS AVAILABLE ON REQUEST

SOLD IN BULK REELS OF 5, 10, 25, 50 & 100 FT. PRICE $ 3.34/FT.

FOR FIELD SPLICE KIT ORDER 3CCR-7 SEE PAGE 8

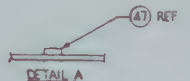
Runs with "3MF" & "3MF" Series Sprockets

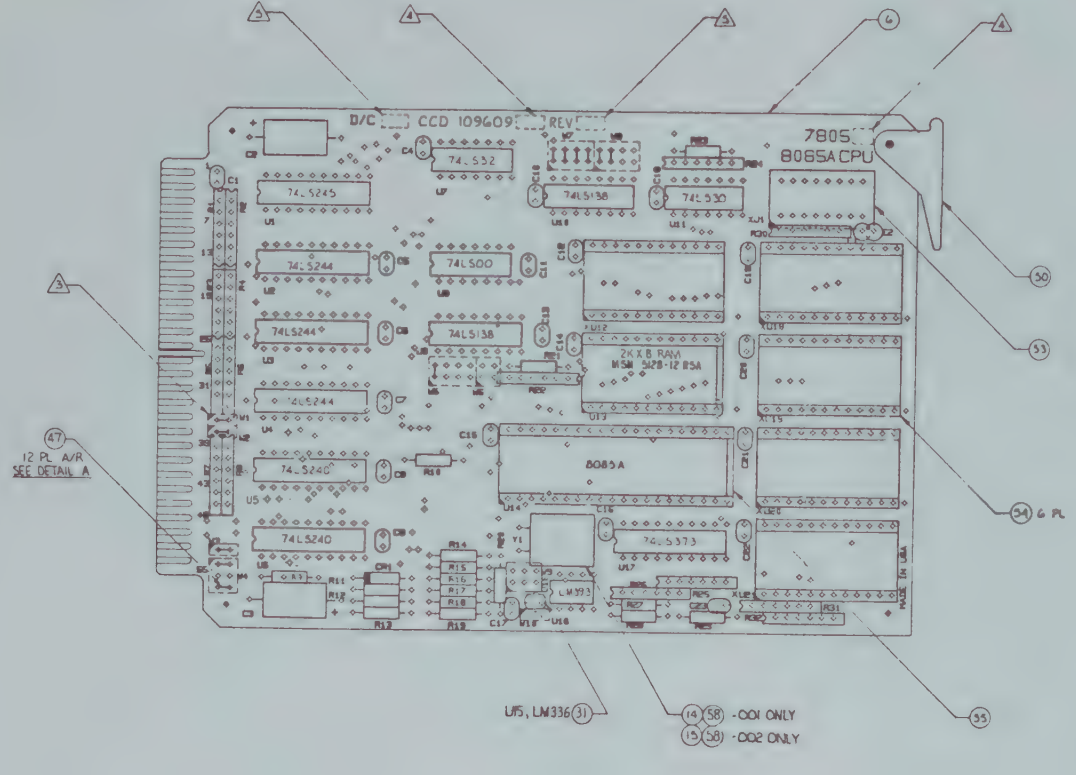

DATA BUS
CPU
U 14 8085A
ADDRESS LATCH
74LS373
CONTROL BUS
ADDRESS BUS
CMOS RAM MEMORY (4K×8)
PROM MEMORY (8K×8)
RAM (2K×8)
U12 RAM 5
U13 RAM 4
PROM 2716 (2K×8)
U18 ROM 3
U19 ROM 2
U20 ROM 1
U21 ROM 0
ADDRESS DECODER
74LS138
U9
U10
ADDRESS
C000 - FFFF
8000 - BFFF
4000 - 7FFF
0000 - 3FFF
16K CARD SELECT
CHIP SELECT
DATA BUS CONTROL
IN/OUT
TO DATA BUS DIRECTION
EXT CLK
(LOW TIME 360 ns)
SPARES
MEMEX
HLDA
CLOCK
RESET
WAIT
CNTRL
INTR
BUSRQ
NMIRQ
SID
SOD
ALE
IO/M
RD
WR
MEMRQ
INTA
BUSAK
MCSYNC
ICRO
STATUS 0
STATUS 1
SYSRESET
IO EXP
PC1
PC0
Y1
C17 22pf 50V
SIZE D
DOC NO 109613
REV A
SH 2 OF 2

NOTES UNLESS OTHERWISE SPECIFIED

1. ASSEMBLY PART NO. IS 109614 - XXX. THIS DOCUMENT AND PARTS LIST ARE TRACKING DOCUMENTS.
2. BOARD TO CONFORM WITH ASSEMBLY STANDARDS AS1004.
3. ▷ DENOTES PIN 1.
4. FOR -001 DASH NO., IDENTIFY WITH "-0" 2 PLACES. FOR -002 DASH NO., IDENTIFY WITH "-1" 2 PLACES.
5. IDENTIFY WITH CCD REV LEVEL AND DATE CODE USING A RUBBER STAMP.

REVISIONS		
DOC REV	DESCRIPTION	
A	INITIAL RELEASE PER PCN #2.4)	





SEE SEPARATE PARTS LIST

ITEM NO.	QTY	DESCRIPTION
		PARTS LIST

UNLESS OTHERWISE SPECIFIED
1. DIMENSIONS ARE IN INCHES
2. BREAK ALL SHARP EDGES
3. DO NOT SCALE DRAWING.
4. TOLERANCES: N/A
ANGLES ± —
XX ± —
XXX ± —

PRO-LOG CORPORATION

DRAWN	DATE	
CHECK	DATE	
APPR	DATE	
SCALE		

TITLE: ASSEMBLY, 7805, 8085A CPU CARD

SIZE	DOC NO	REV
D	109614	A

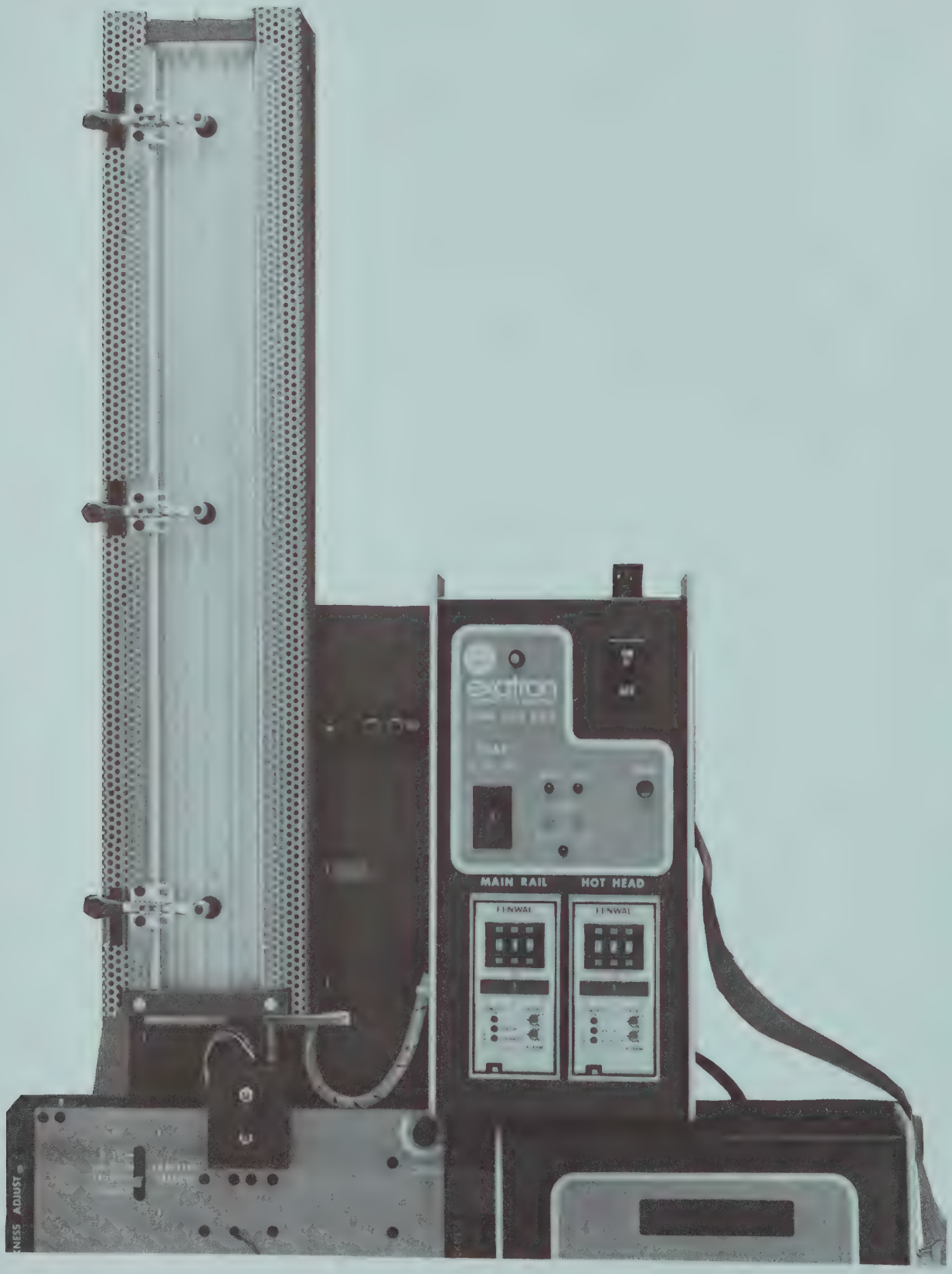
exatron
automatic test equipment

2000 SERIES HOT RAIL

FOR HANDLER MODELS 2200/2500/2900

MODEL 2510

PRELIMINARY EDITION – AUGUST 1983


MAIN RAIL
HOT HEAD
FENWAL
FENWAL

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SECTION I

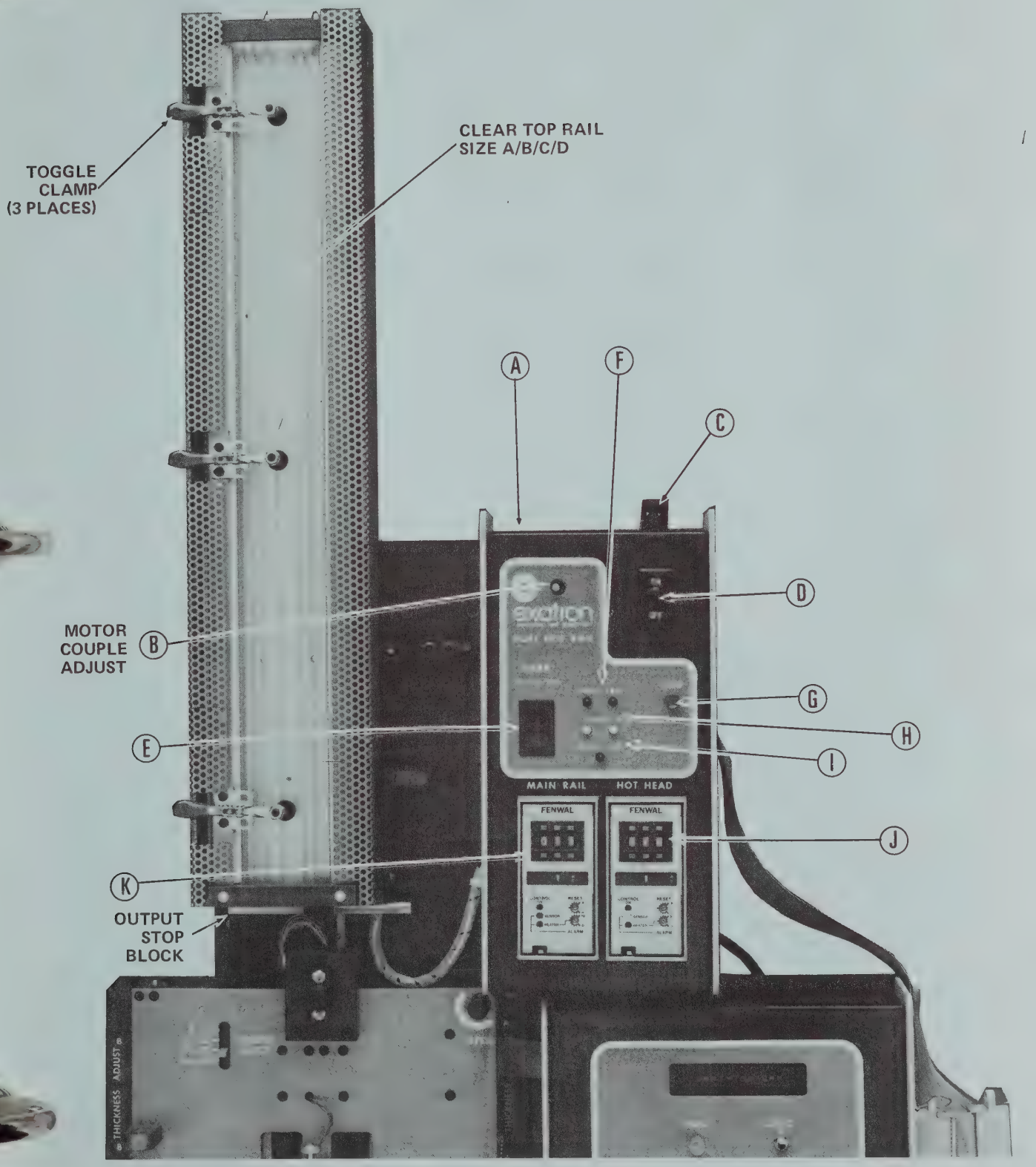
INTRODUCTION

General Description

The Model 2510 Hot Rail provides elevated temperature handling for test applications. It can be ordered with the handler or at some later date since no mechanical modifications are required. The Hot Rail is self aligning. The total rail storage space of 42" (not counting the test site) will heat from ambient to 125° C; will handle DIP packages 0.300", 0.600", and 0.900" and is controlled to be accurate to ±3° C. The Hot Head is a hot plate which allows heating of the test head area of the handler. It is independently controlled from the Hot Rail itself and can be set at a different temperature. The Hot Head adds an additional 8" of heated rail capacity.

Specifications

* 2-21" TRACKS, EACH TRACK HOLDS 0.300", 0.600", AND 0.900" DEVICES
* TEMPERATURE RANGE IS AMBIENT TO 125° C - HIGHER RANGES AVAILABLE BY SPECIAL ORDER
* AUTOMATIC SHIFT FROM ONE TRACK TO THE OTHER
* POSITIVE SOAK CONTROL ADJUSTABLE FROM 0 TO 5 MINUTES
* FITS ALL MODEL 2200/2500/2900 HANDLERS
* UNIT IS FIELD RETROFITABLE
* USES 1/8" DIN STANDARD FENWALL CONTROLLERS
* ACCURACY TO ±3° C - MAIN RAIL
  ±1° C - TEST SITE
* TEST SITE INDEPENDENTLY CONTROLLED FROM MAIN RAIL
* HOT HEAD STANDARD (Test Site Temperature Control)
* RAILS EASILY ACCESSED FROM CLEANING
* HOT SURFACES SHIELDED FOR OPERATOR PROTECTION
* THERMAL RUNAWAY PROTECTED
* NO AIR REQUIRED - 110 VAC, 50/60 Hz - 2 AMPS
  220 VAC by Special Order
* ONE YEAR WARRANTY, PARTS AND LABOR
* HAS NO AFFECT ON TESTER INTERFACE



CLOSE UP PHOTO OF FRONT PANEL

SECTION II

Controls & Displays

* Please note the Front Panel Detail Photograph *

A. MANUAL TURN
Located on the top of Hot Rail is a hole in the sheet metal which is labeled "Push down, Manual turn only". Just below the surface of the sheet metal is the brake mechanism which stops the motor. If it becomes necessary manually move the motor, please see the Manual Move Section of this manual.

B. MOTOR SHAFT
This shaft is turned during the Manual Move Procedure.

C. FUSE/FUSE HOLDER
This is the fuse which protects the Hot Rail from electric shorts. This fuse is in line with both controllers and the motor. If the fuse fails when replaced, unplug the Hot Rail immediately and call Exatron.

D. MAIN POWER ON/OFF
This controls the power going to both the motor and the controllers. Note the timing electronics is powered by the Handler and thus can only be turned off if the Handler is turned off or if the flat cable is unplugged.

E. SOAK THUMBWHEEL
The Hot Rail controls the amount of time the D.U.T.'s must be heated. This time is called the Soak Delay. The thumbwheel sets this time. If the setting is "0" then there will be no delay, correspondingly if the thumbwheel is set to "15" there will be a 5 minute delay between the time the parts enter the Hot Rail until they leave the Hot Rail.

SOAK DELAY SETTING CHART

0 - No Delay
1 - 20 seconds
2 - 40 seconds
3 - 1 minute
4 - 1 minute, 20 seconds
5 - 1 minute, 40 seconds
6 - 2 minutes
7 - 2 minutes, 20 seconds
8 - 2 minutes, 40 seconds
9 - 3 minutes
10 - 3 minutes, 20 seconds
11 - 3 minutes, 40 seconds
12 - 4 minutes
13 - 4 minutes, 20 seconds
14 - 4 minutes, 40 seconds
15 - 5 minutes

F. INPUT JAM RED L.E.D.'s

These two L.E,D.'s indicate that the top of either track is jammed. Parts must never be allowed to block either sensor at the top of the Hot Rail. The Soak Delay starts only after the sensor is cleared. The L.E.D.'s will blink when parts are being loaded.

G. JOG RED PUSH BUTTON

This button is used to help realign the Hot Rail motor and can be used to start the handler under certain conditions.

H. READY YELLOW L.E.D.'s

After the parts enter either side of the Hot Rail, the Soak Delay begins. When the Soak Delay is completed, the yellow READY L.E.D. will light. The handler will not cycle parts from a rail which has not completed the Soak Delay.

I. OUTPUT JAM RED L.E.D.

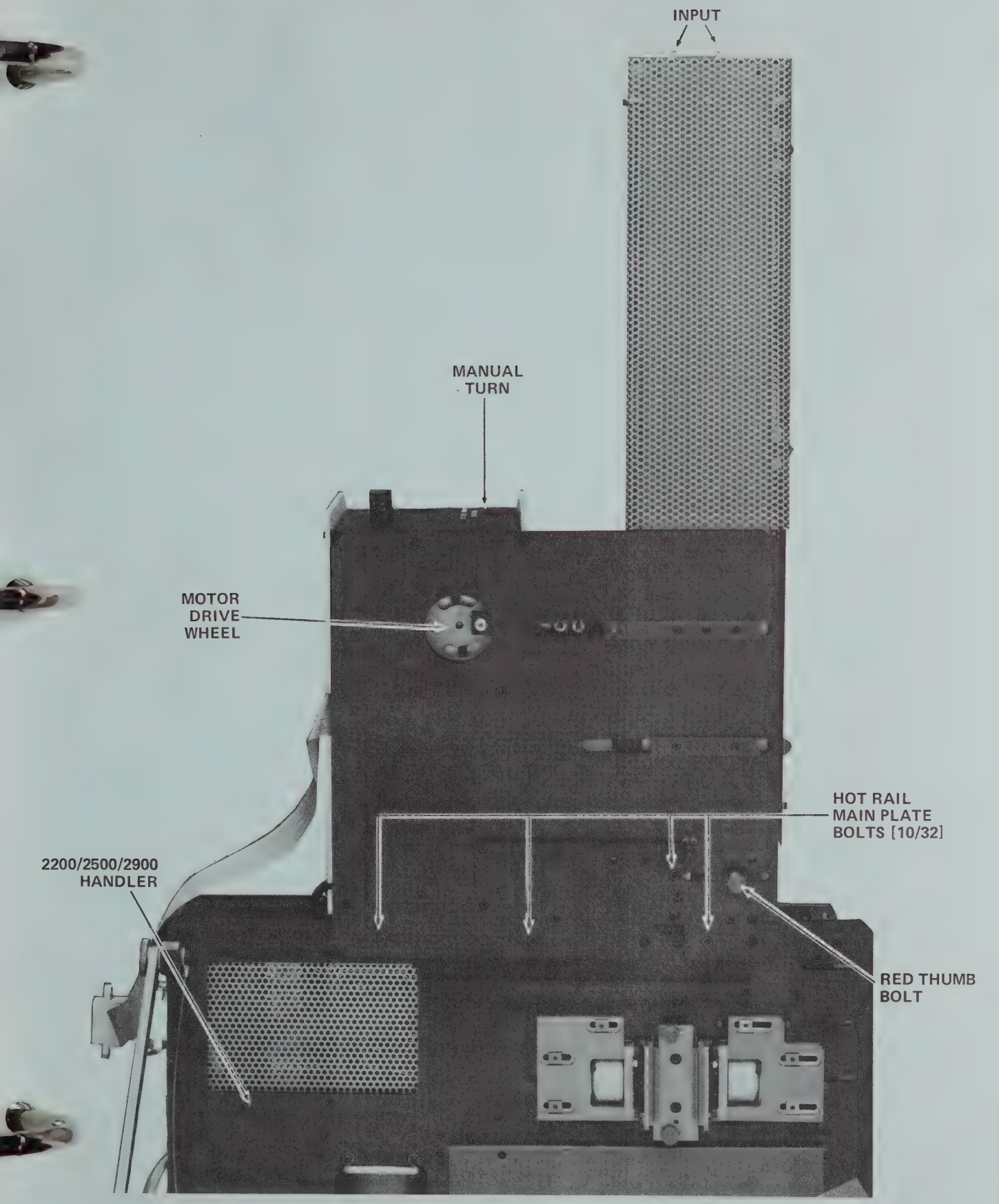
This L.E.D. will light whenever the Hot Rail output is blocked with parts. The motor should never turn on when this L.E.D. is lit. The rail must be clear (L.E.D. off) before the Hot Rail moves to the other track.

J. HOT HEAD TEMPERATURE CONTROLLER

The Hot Head temperature is the measured at the test site in the handler. This temperature is controlled by setting the thumbwheel on the controller. Never set in excess of 125 °C. Simply set the desired temperature and the bar graph on the controller will indicate ±5° of the real temperature as compared to the set temperature.

K. MAIN RAIL TEMPERATURE CONTROLLER

The Main Rail temperature is measured on the bottom dual rail. Set this controller just like the Hot Head controller. NOTE: Never set for in excess of 125° C.


INPUT
MANUAL TURN
MOTOR DRIVE WHEEL
HOT RAIL MAIN PLATE BOLTS [10/32]
2200/2500/2900 HANDLER
RED THUMB BOLT

SECTION III

INITIAL PROCEDURES

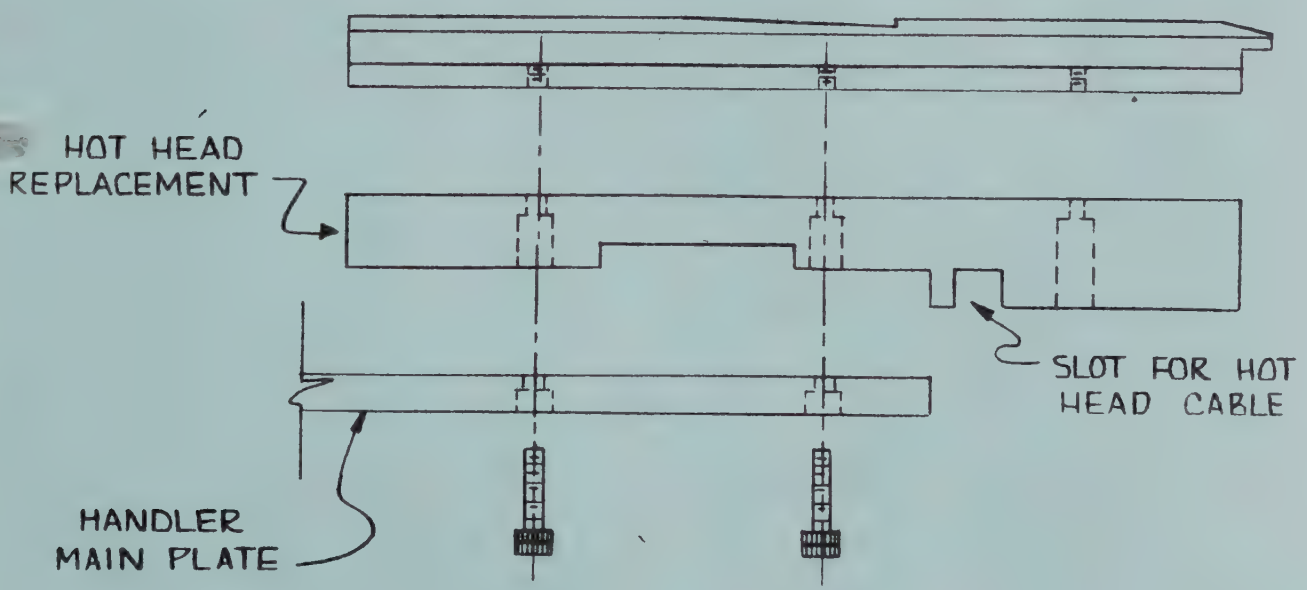
Hot Head Installation

1. If a Hot Head is to be installed on an ambient Handler use the following procedure.
   Hot Rails which are delivered with a Handler should already have the Hot Head installed.

2. Remove the ambient Handler door by removing the four #6-32 x 1/4 allen bolts which hold the door to the hinge.

3. Unplug the 20 wire flat cable.

4. Remove the handler's upper bottom rail and replace the base block with the white Fiberglas part supplied with the Hot Rail.



5. Replace the ambient door with the Hot Head equipped door. Run the Hot Head cable through the notch in the block installed in step 4.

6. The Handler should be checked out with the 8 Sort Simulator Box to make sure all the solenoids and sensors in the new door are operational.

7. Using the following instructions install the Hot Rail.

8. Return the ambient door to Exatron. Failure to do so may result in additional charges. Each door costs $2,000.00.

Hot Rail Installation

* HOT HEAD SHOULD BE INSTALLED FIRST *

1. Unpack the Hot Rail and examine carefully for signs of external damage. Continue only if Hot Rail is in perfect condition.

2. Remove the manual two tube input bracket on the top of the Handler if installed. This is held in place by two #10-32 allen bolts.

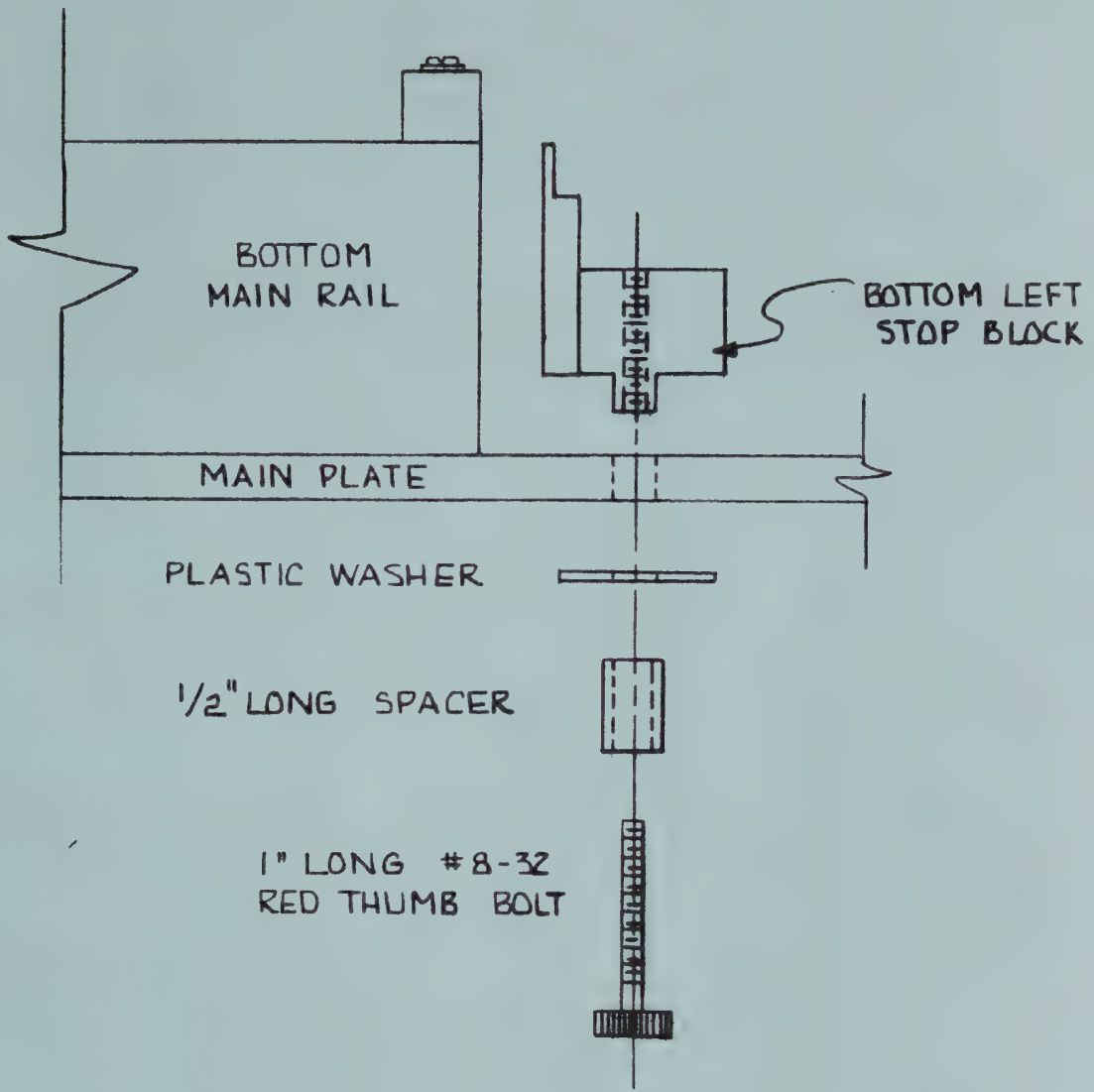
3. Lift the Hot Rail and set it on the top edge of the Handler main plate. There are two "L" brackets at the base of the Hot Rail which temporarily hold the Hot Rail to the Handler.

4. Align the holes along the base of the Hot Rail main plate with the threaded holes along the top of the Handler main plate.

5. Bolt together using the five #10-32 x 3/8 allen bolts supplied with the Hot Rail.

6. To remove the Hot Rail, simply reverse the procedure.

7. The bottom left stop block is removed to shipping. Refer to the photograph for location. This block must be replaced on the Hot Rail main plate at the bottom of the the main rail prior to use of the Hot Rail.



8. Plug the ribbon cable into the Handler Control Port on the side of the Handler.

9. Plug the power cord into 110VAC only.

10. Plug in the Hot Head connectors. NOTE: The thermal couple connector must not be reversed. Verify the correct installation.

11. Follow the Initial Check Out Procedure to assure safe, smooth operation of the system.

Initial Check-Out Procedure

1. PRIOR TO INSTALLING AND OPERATING HOT RAIL READ THE CONTROLS AND DISPLAY SECTION TO FAMILIARIZE YOURSELF WITH THE HOT RAIL.

2. Install Hot Rail following the procedure outlined in the installation section.

3. Turn on the power to the Handler and watch for the P.R.O.M. REV. message. There should be the letter "H" at the end of this message. If the letter "H" does not appear contact the factory at once. The proper Handler software for the operation of the Hot Rail has not been included.

4. Set both of the temperature controllers to 020° C (Room Temperature).

5. Turn on the power to the Hot Rail.

6. Set the thumbwheel for "0" and block both input sensors at the top of the rail. The red input jam L.E.D. will light when the input sensors are blocked. The yellow ready L.E.D. will light as soon as the sensors are cleared. The red and yellow L.E.D.'s will toggle back and forth.

7. Now set the thumbwheel to "1" and block both input sensors again, the red L.E.D.'s will light. Clear the sensors and wait for the yellow L.E.D.'s to light, there should be a delay of 20 seconds after the input sensors are cleared.

8. If desired all 16 settings of the thumbwheel can be checked.

9. The bottom sensor is located just above where the bottom handler rail stops. Check this sensor by blocking it with a piece of paper. The red output jam L.E.D. will light when the sensor is covered.

10. Both controllers will indicate a temperature close to 020 C, depending on the room temperature.

11. With the Handler displaying "READY TO RUN", push the run button on the Front Panel of the Handler. The rail will move to the opposite side and stop. The Handler will now display "EMPTY OR JAM".

12. Push to red JOG button on the Hot Rail and the rail will move back to the other side.

13. Set the controllers to the desired temperatures. The rails and hot head will heat accordingly.

SECTION IV

OPERATOR SET UP INSTRUCTIONS

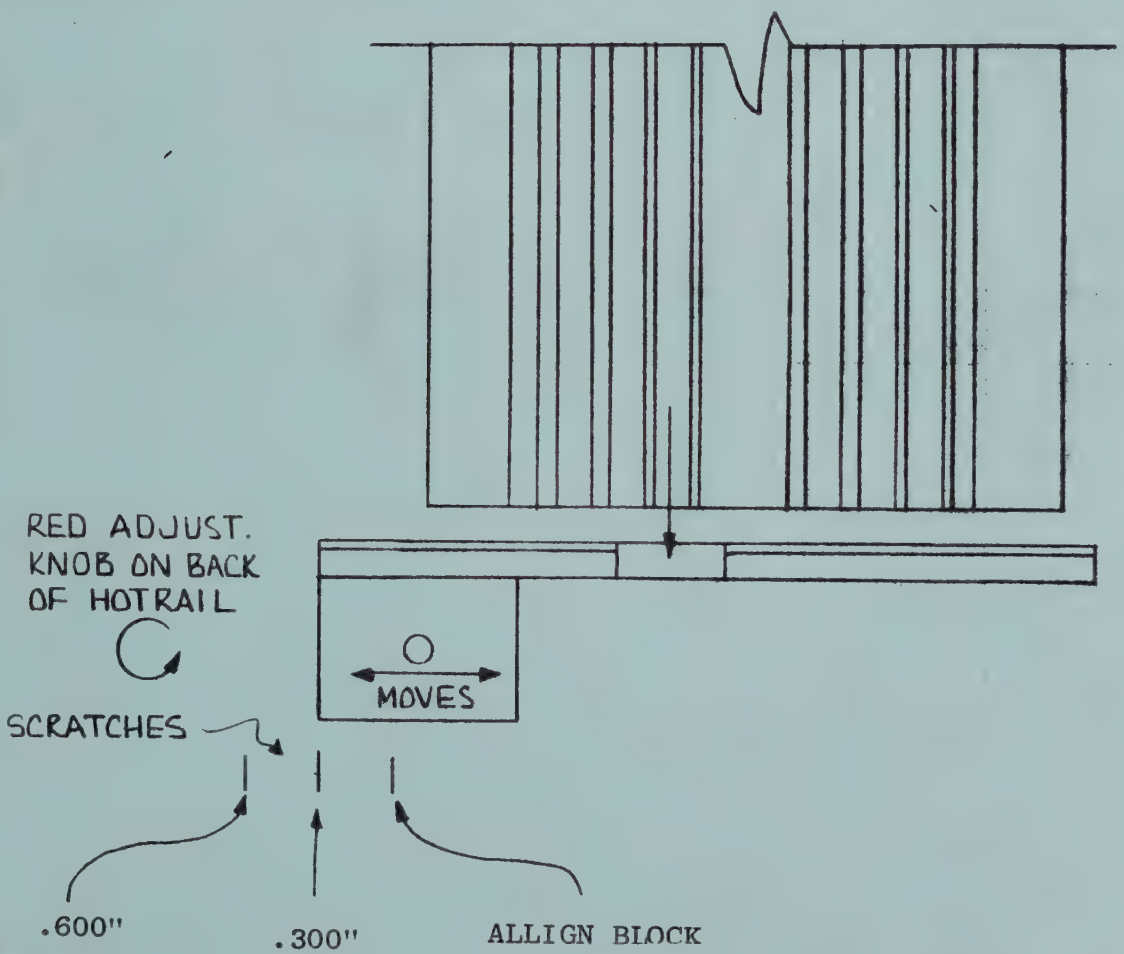
Set Up Instructions

1. BEFORE CONTINUING WITH THE OPERATOR SET UP INSTRUCTIONS READ THE CONTROL & DISPLAY SECTION.

2. Select the correct Lexan Top Rail for the parts to be tested. Use the Selection Chart following these instructions.

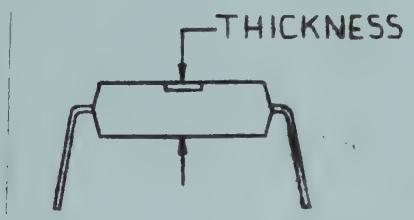
ESD Note: The device legs do not come near the top rail so it is unlikely the need for a conductive top rail would arise. Top rails made of a conductive material are available at additional cost. The conductive rails are not transparent.

3. Adjust the bottom left stop block for 0.300" or 0.600" operation.



Top Rail Selection Chart

A. The top Rail must be changed when ever there is a change in the thickness of the devices.

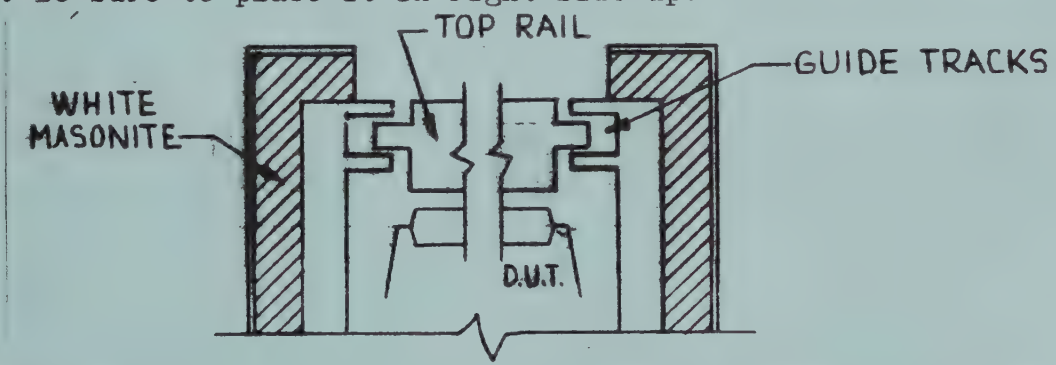


B. THE TOP RAIL MUSH BE AT AMBIENT (ROOM) TEMPERATURE WHEN IT IS REMOVED FROM THE HOT RAIL. DO NOT REMOVE TOP RAILS AFTER USE UNTIL IT HAS COOLED DOWN.

C. To change a top rail, unclamp all three toggle clamps which hold the rail in place.

D. Slide the top rail up along the guide tracks and out of the Hot Rail.

E. To replace a top rail, slide it into the Hot Rail along the guide tracks. Be sure to place it in right side up.



F. Always use the correct top rail for the thickness of the parts to be handled.

Thickness Selection Chart

Top Rail	Size	Device Thickness (Range in Inches)
A	.218	.100 - .125
B	.187	.125 - .156
C	.156	.156 - .187
D	.093	.187 - .250

Other sizes available to your specifications.

SECTION V

HANDLER ALPHA/NUMERIC DISPLAYS

1. "AUTO INPUT ERROR"

   A. The sensors which control the position of the motor are not aligned.
   B. Check that the Hot Rail is plugged into 110VAC and turned on.
   C. Check the 24 wire control cable.
   D. Push the red "JOG" button on the Hot Rail.
   E. The Hot Rail should turn on and correct the problem.
   F. If not, check that your tester interface conforms to the Interface Note in this manual.
   B. The sensors may be defective, check for proper operation.

2. "H RAIL NOT READY"

   A. The Soak Time is not competed.
   B. In the AUTO Mode, the handler will automatically start when the soak time is completed.

3. "HOT RAIL LEFT"

   A. Motor is trying to move the main Hot Rail to the left.

4. "HOT RAIL RIGHT"

   A. Motor is trying to move the main Hot Rail to the right.

5. "JOG HOT RAIL"

   A. The motor is moving the Hot Rail from an unknown position, could move either right or left.

6. "MOTOR ON? JAM?"

   A. Verify the motor power is on.
   B. Push the red JOG button.
   C. If a jam has occurred, refer to the Manual Turn Section.

SECTION VI

TESTER INTERFACE NOTE

The Hot Rail uses the Tester Control Port on the Handler as a bus. The Hot Rail has a tri-state interface to pins 3,4,5,6,7, & 8. If you use these bin lines on your interface, you may have to tri-state your tester. Consult Exatron if you have an interface problem. The Handler is computer controlled so there may be many ways to solve problems.

The Handler will issue a tri-state control during test, "TEST IN PROGRESS" on the display. This tri-state control is normally high, but is low during the entire test time. It is recommended to use open collector drivers when using the handler/hot rail on non PASS/FAIL interfaces. This signal appears on pin 21 of the Handler control connector.

PASS/FAIL interfaces should use Handler Control Connector pin 1 for pass and pin 2 for fail. If used in this way, Hot Rail should have no effect on the interface.

The 8-Sort Simulator Box must be slightly modified.

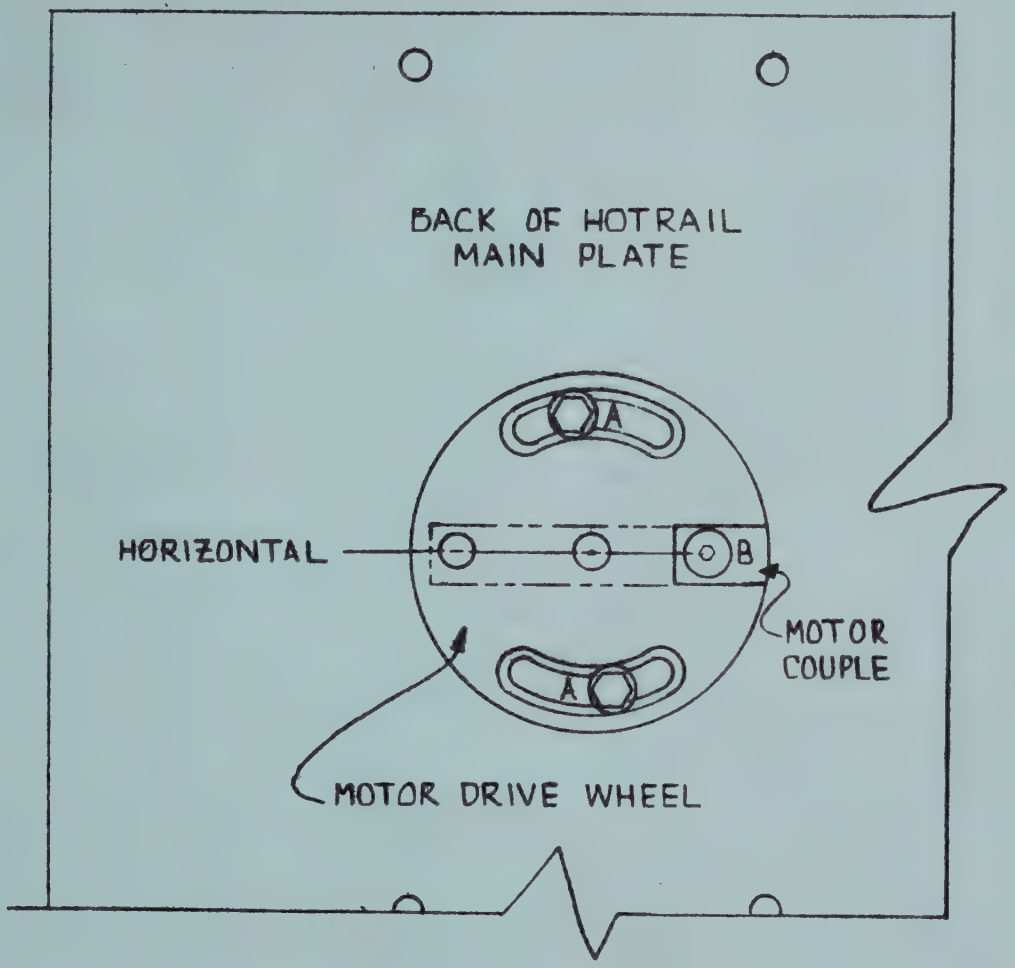
A. Cut the ground trace going to I.C. 12, pins 1 and 19.
B. Add a jumper from I.C. 12 pins 1 and 19 to I.C. 9, pin 3.

SECTION VII

MECHANICAL CALIBRATION

Mechanical Calibration Procedure

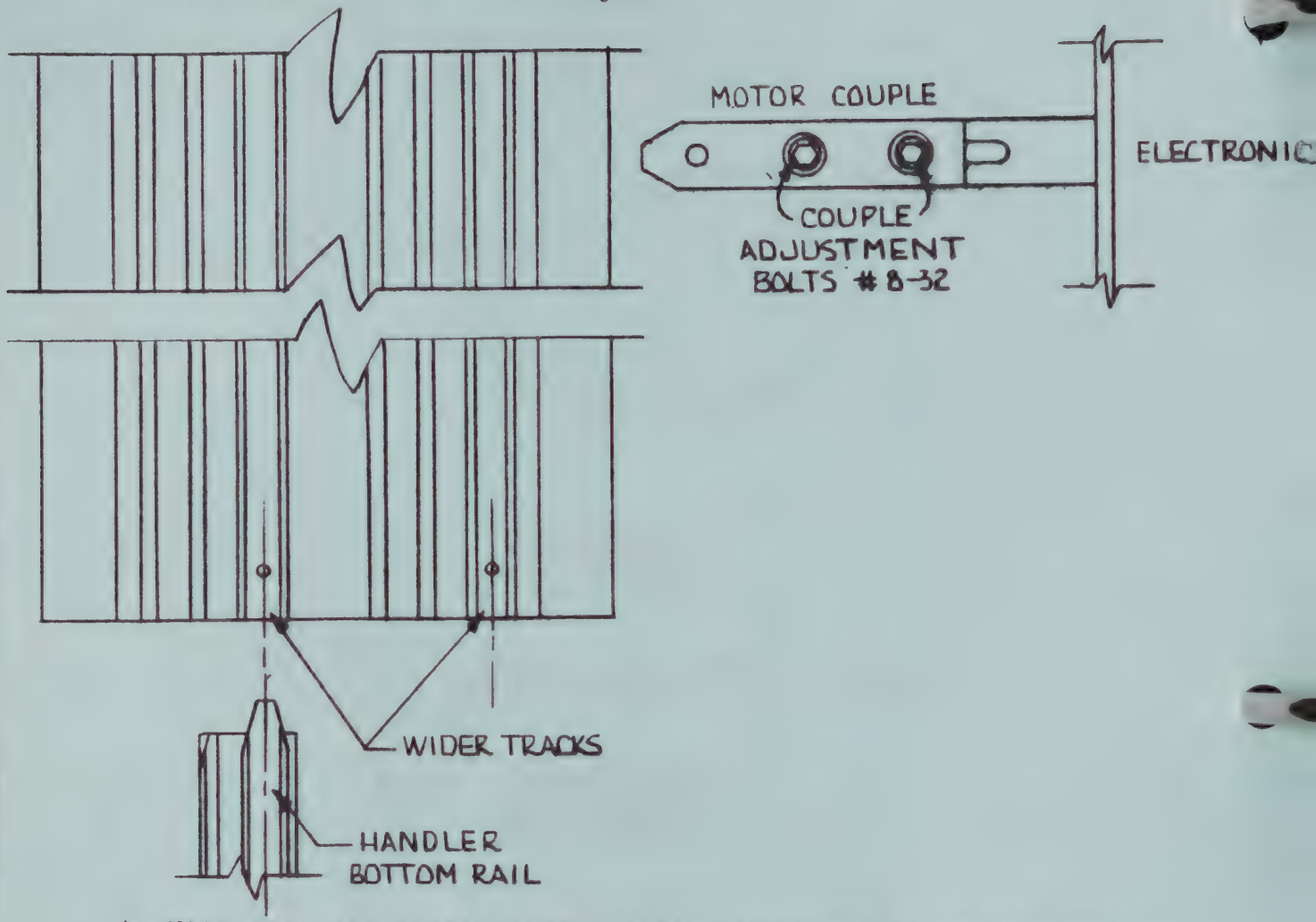
1. Motor rotational travel adjustment



Back of Hot Rail Main Plate

A. Verify rotational travel of motor of 180 horizontal movement.
B. The motor drive wheel can be adjusted by loosening the 2 #8-32 bolts labeled A.
C. The drive wheel should travel exactly 1/2 revolution and the #10-32 bolt labeled B should stop in a horizontal plane drawn through the center of the drive wheel.

2. Rail Right/Left Movement Adjust



A. With the rail in the left position (furthest from electronics), the motor couple can be adjusted.
B. Loosen the two #8-32x5/8 bolts, but do not remove.
C. Move rail until the wider part of the track is exactly in line with the wider part of the handler's bottom rail. This procedure should be done with the handler door open.
D. Retighten the #8-32 adjust bolts.
E. Jog the mail rail to the right position and check the alignment of the rail wide track and the handler bottom rail.
F. If rail does not align, check motor rotational travel adjust.

3. Bottom Sensor Adjust
(Confirm adjustment, this seldom needs adjusting.)
A. When the Hot Rail is empty and at rest the red L.E.D. for "OUTPUT JAM" will be off.
B. Jog the motor and the "OUTPUT JAM" L.E.D. will light during travel, then turn off when the motor stops.

C. If this does not occur as described, it is possible the bottom sensor is out of adjustment. First check the Rail Right/Left Movement Adjustment, then recheck steps 3A and 3B.
D. If Steps 3A and 3B still fail, remove the wire cover (See Photo) and the bottom left stop block.
E. By looking up from where the bottom left stop block was you can see a small P.C.B. with one sensor on it.
F. This sensor should look straight up and through one of the two holes in the main rail. A L.E.D. above the rail shines down through this hole to turn off the sensor.
G. Loosen the two #2-56 allen bolts which hold the P.C.B. in place and adjust the position of the P.C.B. until the sensor is in alignment. The "OUTPUT JAM" L.E.D. will turn off when the alignment is correct.
H. Retighten the two #2-56 allen bolts and replace both the wire cover and the bottom left step block. Do not allow any wires to be pinched by the cover.

Manual Turn Operation

1. If your Hot Rail is jammed or otherwise not able to move under its own power you may have to move the rail manually.

2. Unplug the power cord from the Hot Rail.

3. Never attempt a manual turn with the power turned on.

4. See the Controls & Displays Section, parts A and B.

5. Push down on the motor brake at the top of the Hot Rail.

6. Rotate the motor shaft in any direction with your fingers.

7. Try to leave the rails aligned with the Handler when you turn the power back on.

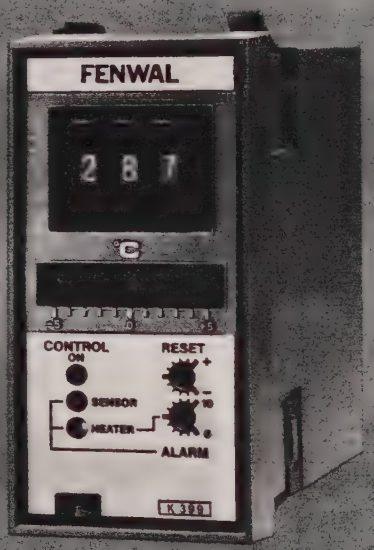
SECTION VIII

TEMPERATURE CALIBRATION

Controller Calibration

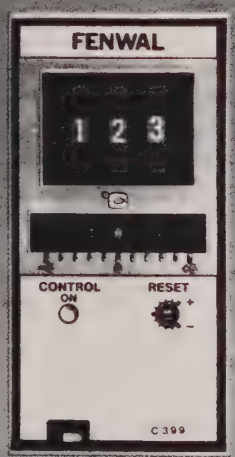
Please refer to the Fenwall Controller Data Sheet following.

FENWAL®



Cat. No. 14-033X71-X0X

Cat. Nos. 14-013071-X0X
14-043071-X0X



Cat. No. 14-003X71-X0X

SERIES 140 - 1/8 DIN

THERMOCOUPLE SENSING TEMPERATURE CONTROLLER

FEATURES

- ★ COMPACT
- ★ DIGITAL SET POINT
- ★ L.E.D. DEVIATION INDICATION
- ★ HEATER/SENSOR ALARM
- ★ TEMPERATURE ALARM
- ★ ALARM BAND
- ★ RACK MOUNTING
- ★ AVAILABLE IN °F or °C CALIBRATION

GENERAL INFORMATION

Fenwal introduces the latest in a long and respected line of temperature controllers, the Series 140 - 1/8 DIN. This moderately priced, multi-purpose controller offers a variety of alarm options including heater/sensor alarm, temperature alarm or alarm band. All models with the alarm option indicate alarm condition by illumination of a red LED on the controller face as well as by energizing an alarm circuit which permits audible alarm by connection to a bell, horn, claxxon or whistle, or additional visual alarm by connection to an appropriate light source.

Set point indication is obtained by depressing push buttons located above and below indicator windows on the upper face of the controller. The first window indicates hundreds of degrees, the second tens of degrees and the third, single degrees. The upper buttons lower the numbers, the lower buttons raise the numbers to the desired set point. Should the process temperature vary from the set point, shown as a green L.E.D., at zero, on the deviation meter, a red L.E.D. will light up to the right of zero showing overshoot, above set point or to the left of zero indicating below set point. Below set point readings will call for heat, the controller will cycle a "heater on" condition and proportionately bring the process up to set point.

APPLICATIONS:

- PACKAGING MACHINERY
- HOT STAMPING PRESSES
- HOT MELT ADHESIVE DISPENSORS
- PLASTICS PROCESSING EQUIPMENT
- COMMERCIAL OVENS
- ENVIRONMENTAL CHAMBERS
- LABORATORY EQUIPMENT
- PLATING PROCESS EQUIPMENT

ALARM OPTIONS

TEMPERATURE ALARM - A red L.E.D. on the controller face, marked ALARM, will indicate that process temperature has gone over set point. Simultaneously the alarm circuit will close, triggering the customer's choice of external alarms.

HEATER/SENSOR ALARM - This alarm system functions in conjunction with a current transformer and can be used to monitor one heater or an entire single phase network. Either of the heater lead wires is inserted through opening in the current transformer and then connected to the proper terminal on the controller. When the current transformer senses zero current and the controller calls for heat ("CONTROL ON" L.E.D. lit) it will alarm by lighting a red L.E.D. on the controller face marked HEATER, and also close the alarm circuit permitting an external alarm. In the event of a thermocouple lead break, the red L.E.D. marked "SENSOR" will light, the red L.E.D. in the deviation meter will shift to the far right (+5 position) and the alarm contacts will close activating the customer supplied external alarm.

TEMPERATURE ALARM BAND

A red L.E.D. on the controller face, marked ALARM, will indicate that process temperature has exceeded the preset high limit or fallen below the preset low limit of the alarm band. Simultaneously the alarm circuit will close, triggering the customer's choice of external alarms, visual or audible. The deviation meter will indicate an overshoot or undershoot of the alarm band.

ACCESSORIES

Replacement current transformers are available for use with Model 14-033X71-40X. Two configurations are offered, Catalog Number 06-117041-001 with mounting flange (standard) or 06-117040-001 without mounting flange.

SPECIFICATIONS

CONTROL MODE
Time Proportioning with Manual Reset (offset adjustment)

[illegible] MODE
On/Off Temperature Alarm Automatic Reset; Heater/Sensor Alarm Latching Requires Power Outage to Reset

TEMPERATURE RANGE
0 to 999°F and 0-399°C

THERMOCOUPLE
ISA/Type "J"

INPUT POWER
120/240 VAC, +10%/−15%, 50-60Hz

POWER CONSUMPTION
5 Watts, (typical); no load

SET POINT ADJUSTMENT
Push-button digital switches

AMBIENT TEMPERATURE LIMITS
Operating = 15° to 131°F (−10° to 55°C)
Storage = 0 to 158°F (−20° to 70°C)

OUTPUT
Controller, SPDT relay 3A/120, 0.5A/240 VAC, Resistive Load; Alarms, SPST (normally open only) relay 3A/120, 1.5A/240 VAC: 25A @ 240VA inductive.

SET POINT ACCURACY
±1.0% typical

CYCLE TIME (Non-Adjustable)
23 seconds relay
[illegible]nds solid state relay driver

[illegible]RTIONING BANDWIDTH
1% of span

INDICATION
Deviation type ±5% of span via red L.E.D., green L.E.D. indicates power on and deviation is within the proportioning band

INDICATOR LIGHTS
Single Set Point Models - red L.E.D. indicates controller calling for heat

Temperature Alarm Models - Additional red L.E.D. indicates alarm condition

Heater/Sensor Alarm Models - Two additional red L.E.D.'s indicates heater open condition and open sensor

TEMPERATURE ALARM
Travelling differential type, adjustable to 10% of span above or below set point. Dual set points are standard. N.A. with S.S.R. output

HEATER/SENSOR ALARM
Heater and sensor alarm have common output relay Heater alarm operates in conjunction with a current transformer (P.N. 06-117040-001) supplied with the controller. Current sensing range 1 to 30 Amps with single heater detection. 1 to 10 Amp adjustable when sensing one heater in network.

TEMPERATURE ALARM BAND
Travelling alarm band symmetrical to set point, adjusts to plus/minus 10% of span, not available with SSR output.

CASE CONSTRUCTION
Rugged molded plastic, plug-in control module.

MOUNTING
Panel mounting, integral mounting clips, current transformer slips on #10 wire (maximum) mounts with screws to the panel.

TERMINALIZATION
Screw barrier strip on rear of housing; will accept bare wire or #6 spade/ring terminals

WEIGHT
und (.45kg).

PANEL CUT-OUT
1.69"W (43 ± .5mm) × 3.56"H (90.5 ± .5mm).

FRONT SIZE
1/8 DIN (48mm W × 96mm H/1.89" W × 3.78"H)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

HOW TO ORDER

TABLE I - INSTRUMENT IDENTIFICATION

14 - 0X3X71 - X0X

ALARM MODE	Code
No Alarm	0
Temp. Alarm	1
Heater/Sensor Alarm	3
Temp Alarm Band	4

TEMPERATURE RANGE	Code
0-999 °F	104
0-399 °C	203

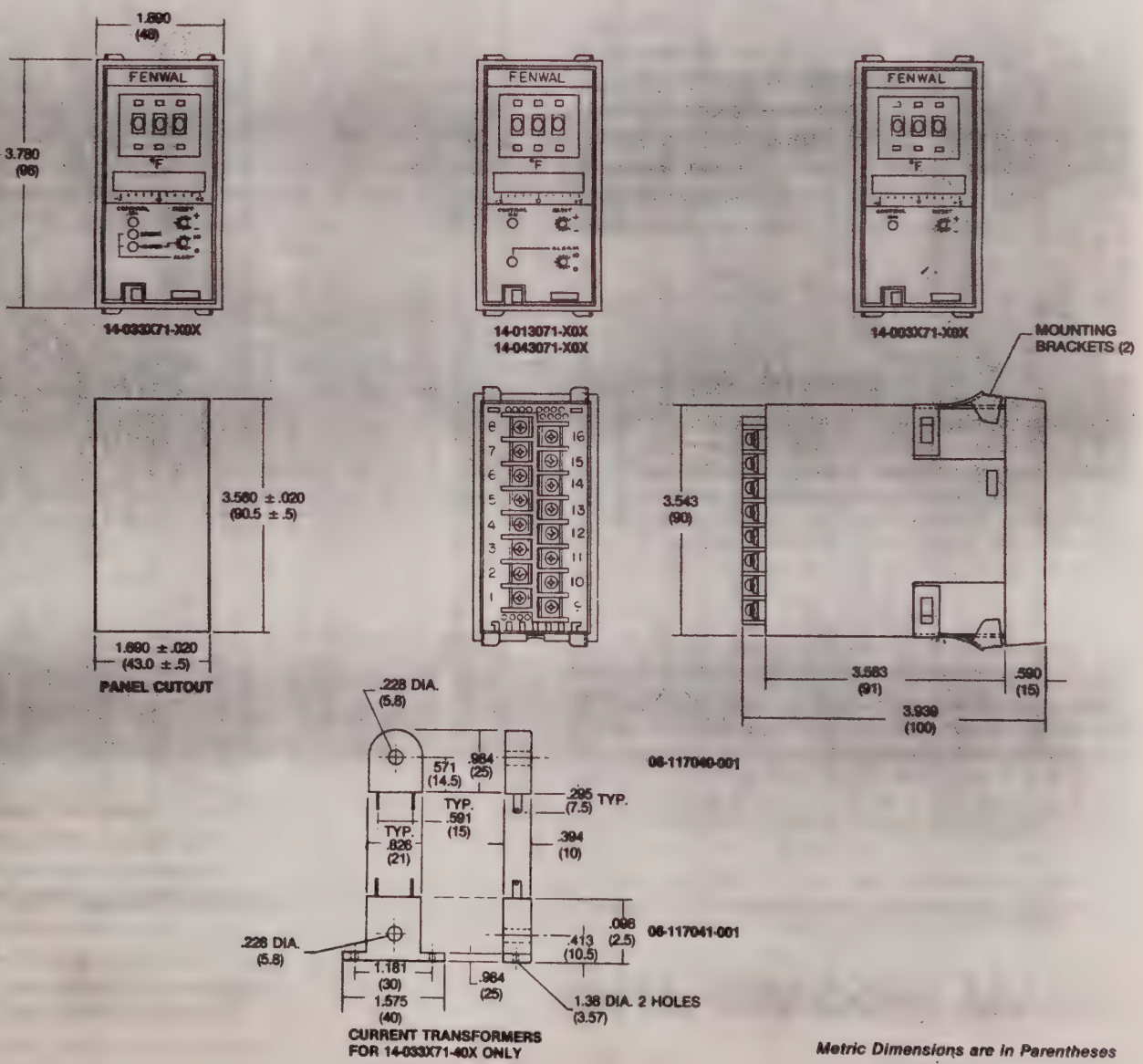
OUTPUT	Code
Relay	0
SSR	2

Example: 14-043071-104 = Controller with Temperature Alarm Band; Relay output and 0-999 °F temperature range.

NOTE: *All units control in the proportioning mode, have a deviation indication and use Type J thermocouple sensor.*

1. Select instrument from Table I by choice of Alarm, Output and Temperature Range.
2. To order proper thermocouple configuration, refer to Fenwal Brochure 6.30.

OUTLINE DIMENSIONS



Metric Dimensions are in Parentheses

FENWAL SERIES 140 1/8 DIN TEMPERATURE CONTROLLER - THERMOCOUPLE SENSING

OPERATING INSTRUCTIONS

(Preliminary)

GENERAL INFORMATION

Fenwal introduces the latest in a long and respected line of temperature controllers, the Series 140 - 1/8 DIN. This moderately priced, multi-purpose controller offers a variety of alarm options including heater/sensor alarm, temperature alarm or alarm band. All models with the alarm option indicate alarm condition by illumination of a red LED on the controller face as well as by energizing an alarm circuit which permits audible alarm by connection to a bell, horn, claxxon or whistle, or additional visual alarm by connection to an appropriate light source.

Set point indication is obtained by depressing push buttons located above and below indicator windows on the upper face of the controller. The first window indicates hundreds of degrees, the second tens of degrees and the third, single degrees. The upper buttons lower the numbers, the lower buttons raise the numbers to the desired set point. Should the process temperature vary from the set point, shown as a green L.E.D., at zero, on the deviation meter, a red L.E.D. will light up to the right of zero showing overshoot, above set point or to the left of zero indicating below set point. Below set point readings will call for heat, the controller will cycle a "heater on" condition and proportionately bring the process up to set point.

ALARM OPTIONS

TEMPERATURE ALARM - A red L.E.D. on the controller face, marked ALARM, will indicate that process temperature has gone over set point. Simultaneously the alarm circuit will close, triggering the customer's choice of external alarms.

HEATER/SENSOR ALARM - This alarm system functions in conjunction with a current transformer and can be used to monitor one heater or an entire single phase network. Either of the heater lead wires is inserted through opening in the current transformer and then connected to the proper terminal on the controller. When the current transformer senses zero current and the controller calls for heat ("CONTROL ON" L.E.D. lit) it will alarm by lighting a red L.E.D. on the controller face marked HEATER, and also close the alarm circuit permitting an external alarm. In the event of a thermocouple lead break, the red L.E.D. marked "SENSOR" will light, the red L.E.D. in the deviation meter will shift to the far right (+5 position) and the alarm contacts will close activating the customer supplied external alarm.

TEMPERATURE ALARM BAND - A red L.E.D. on the controller face, marked ALARM, will indicate that process temperature has exceeded the preset high limit or fallen below the preset low limit of the alarm band. Simultaneously the alarm circuit will close, triggering the customer's choice of external alarms, visual or audible The deviation meter will indicate an overshoot or undershoot of the alarm band.

OPERATION

1. Apply input power to the controller and allow to stabilize.

2. Single or first set point is selected by depressing lower push buttons to raise temperature and upper push buttons to lower temperature.

3. Deviation from set point is indicated by LED's.

4. Control "on" light indicates controller output action. Red light indicates relay is energized or controller is calling for heat.

5. Eliminate "offset" or "droop" by adjusting RESET control clockwise (+) or counterclockwise (-) to bring control set point and process temperature into coincidence.

NOTE: Allow system to stablize before adjusting RESET.

6. Alarm Set Point And Alarm Band Adjustment:

   a) Connect a thermocouple or add a jumper wire between sensor terminals "+" and "-" on thermocouple models.

   b) Adjust push button switches to indicate room temperature.

   c) If second point relay is to be set below control point proceed to Step "f", if second point relay is to be set above control point proceed to Step "d".

   d) Change point below reading noted in Step "b" by the difference desired. Example: Step "b" reading 77°F, difference desired 10F°, therefore set 67°F with set point knob.

   e) Turn "Alarm" adjustment clockwise (towards "+") until you hear the second point relay activate. An ohmmeter connected between terminals S1 and S2 can also be used to monitor continuity.

   f) Turn set point knob above reading noted in Step "b" by the difference desired. Example: Step "b" reading 72°F, difference desired 20F° therefore set 92°F with set point knob.

   g) Turn "Alarm" adjustment counterclockwise (toward "-") until you hear the second point relay activate. An ohmmeter connected between terminals S1 and S2 can also be used to monitor continuity.

   h) If the desired setting of the "Alarm" is not possible by above procedure, elevate the sensor temperature or use a milli-volt source to simulate higher temperature for thermocouple models.

Heater/Sensor Alarm Operation

1. Install the current transformer on the leadwire to the heater or heater network, and connect the leads from the current transformer to terminals 7 and 8, marked "H" on the controller.

2. If detecting one heater or a total network, adjust the alarm potentiometer on the front to minimum position "0". In this case, the maximum current sensed is limited by the size wire which can pass through the hole in the current transformer (AWG #10/Copper). Maximum current is 30 Amps. The minimum current is 1 Amp. Energize the controller and load. With the continuity in the heater circuit the alarm light remains out and the alarm contact S1 and S2 are open. Opening the heater circuit will produce an alarm condition, but only when the controller calls for heat. If the controller is not calling for heat the alarm will not occur until the controller once again calls for heat. Once in the alarm mode, the light and relay will latch in the "On" position. In order to reset the alarm condition, the open heater defect must be corrected and the controller power turned "Off" and then back "On" again.

   A similar alarm condition results when an open thermocouple occurs and the LED deviation indicator will show an overtemperature condition.

3. If more than one heater is being used in parallel network, and failure of one of the heaters must be detected, install the current transformer in the common lead to the parallel heater network. Slowly adjust the alarm potentiometer on the front of the controller clockwise when calling for heat, until an alarm condition occurs and then back counter clockwise slightly. Reset the alarm by turning power "Off" and back "On". If the alarm reoccurs, adjust the alarm potentiometer slightly counter clockwise and repeat until a setting is obtained where an alarm does not occur. When adjusted properly, disconnecting one heater from the parallel network will produce an alarm when the controller calls for heat. The current adjustment range when sensing one heater failure in a parallel network is 1 Amp minimum to 10 Amps maximum.

   A similar alarm condition results when an open thermocouple occurs and the LED deviation indicator will show an overtemperature condition.

PROBE APPLICATION HINTS

Proper placement of the probe is important. The probe tip is the sensing element in the system and must be in direct contact with the process material to provide optimum sensing accuracy. With a thermocouple, 1" immersion is usually satisfactory for either liquid or solid application.

NOTE: To maintain controller accuracy, total thermocouple resistance per lead should not exceed 150 ohms.

INSTALLATION

The Series 140 Controller is standard 1/8 DIN and is designed for panel mounting.

MOUNTING

Simplicity of mounting and removal for inspection or service are significant advantages of this controller. The housing may be left in the panel when the controller is removed.

Select desired location on the panel and lay out instrument cut-out area. Allow sufficient space behind the panel for instrument and wiring clearance. The recommended panel cutout dimensions are 43 x 90.5 mm. Unit will fit 1/8 DIN opening 46 by 92 mm.

If the rear of the panel is accessible for wiring after installation, mount the instrument housing in the panel cutout first. Otherwise, skip to th Wiring section, complete the wiring connections and then install the instrument housing by pushing it into the cutout from the front of the panel. Several units can be mounted side by side in a single opening. Back ends are then held together by the "E"-shaped clips furnished in with the controller. Push the "E"-shaped clips into the slots provided at the top and bottom of the rear housing.

Wiring

WARNING: To prevent electrical shock and/or instrument damage, all wiring connections must be made with power off.

To connect wires to terminal strips on rear panel of controller, strip 1/4" of insulation from each lead wire, loosen appropriate screws of terminal strip and insert bare wire under metal clamp entering from the inside of the terminal strip. Re-tighten screws securely and check tightness by lightly pulling on lead wire. Properly installed, all wires should hang down from the center of the rear of the controller.

Probe Connections

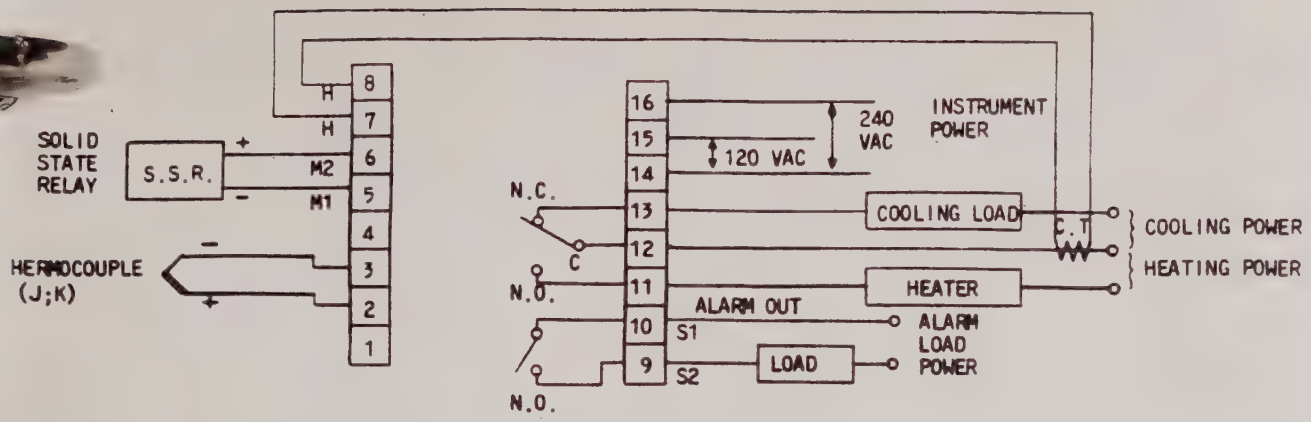
Leads should be well separated from both supply and load lead wire. Long lengths of thermocouple lead wire should either be shielded or contained within metal conduit to minimize radio frequency interference (RFI).

Connect negative lead (red with trace) to Terminal 3 and positive lead (white or yellow) to Terminal 2. See External Wiring Diagram.

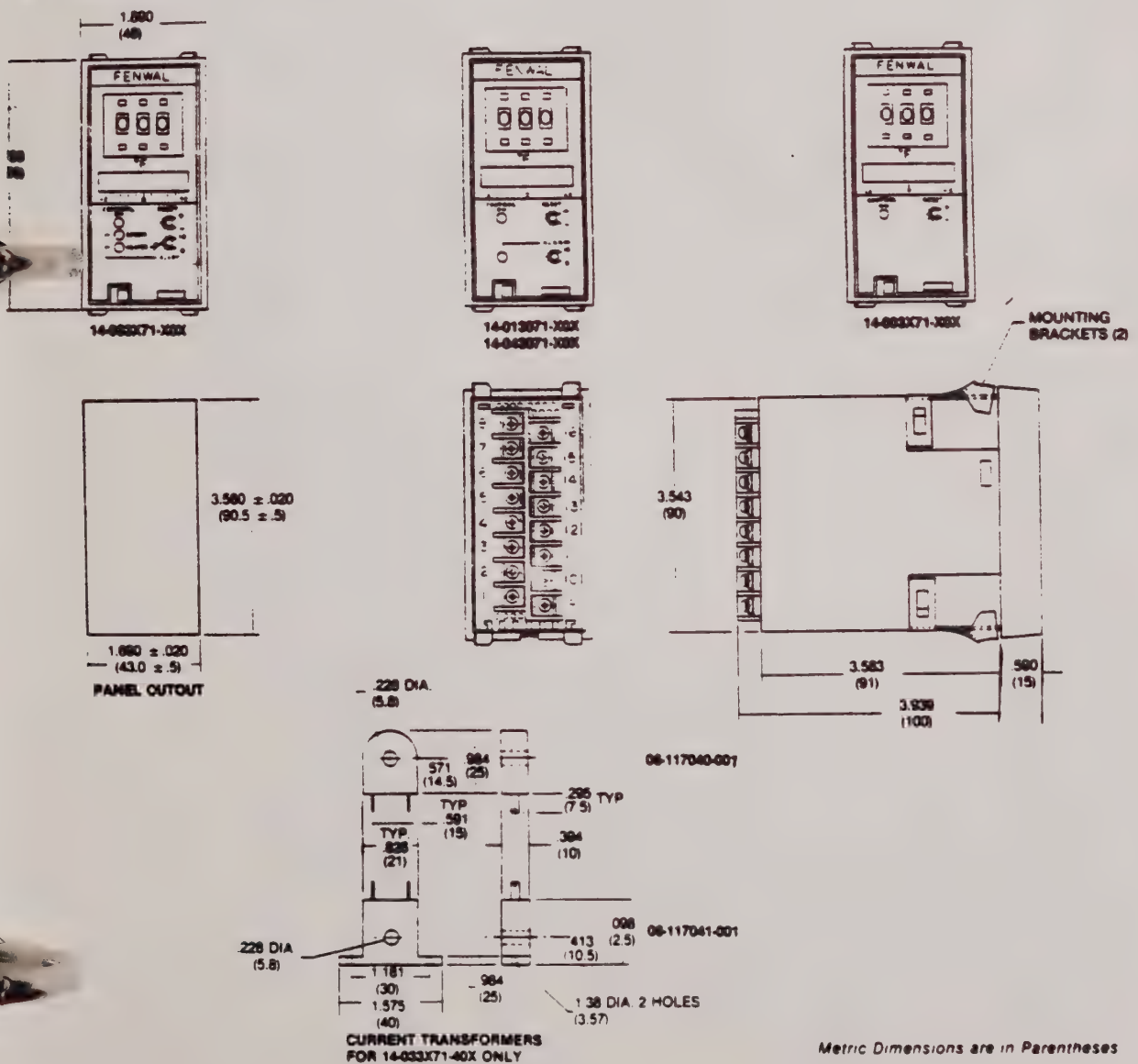
Instrument Power

Fenwal Series 140-1/8 DIN Temperature Controllers have 120 and 240 VAC input voltage capability. Perform all wiring in accordance with local codes and agency requirements. Connect input power as indicated in the External Wiring Diagram.

EXTERNAL WIRING DIAGRAM



NE DIMENSIONS



Metric Dimensions are in Parentheses

SECTION IX

2510 SPARE PARTS LIST

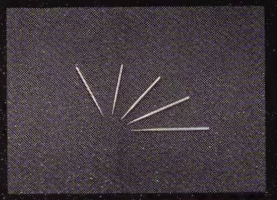
2	74C85 I.C.	A2
2	CD4020 I.C.	A2
1	74C74 I.C.	A2
2	74C14 I.C.	A2
1	74C04 I.C.	A2
1	74LS244 I.C.	A2
1	2N3704 TRANSISTOR	A1
2	1N4148 DIODE	A3
1	MV-5054-2 RED L.E.D.	A7
1	DV-5353 YELLOW L.E.D.	A7
1	8125C PUSH BUTTON SWITCH	A5
1	7527-3 RED PUSH BUTTON	A5
1	T70-03M 16 POSITION THUMBWHEEL	A6
2	K-6253/K-6250 I R LED	A9
2	K5258 OPTO TRANSISTOR	D9
1	D1210 SOLID STATE RELAY	LOOSE

1	MDX-2 2 AMP FUSE	A11
1	3M258 GEAR MOTOR	LOOSE
1	K-8171 OPTO SENSOR	A6
1	THERMAL COUPLE WASHER	A8
1	FENWAL SNAP SWITCH L135C, #08-023121-200	A10
1	HOT WALL .25 DIA - 2.00 L CARTRIDGE HEATER 110VAC HOTWATT 8306 CAT #SC252	A12
1	12 COMPARTMENT BOX #R-612	

increased product life

- Less Set-up Time . . . Reducing Down Time
- Higher Product Reliability

More reliable products are the objective of every manufacturer. Now Ney can solve your dual-in-line testing problem and add more life to your product. All Ney test contacts and probes feature famous Paliney® 7 solid noble metal contacts for accuracy and longer testing life.



ACTUAL SIZE

Ney solid precious metal needle test probes

Ney Type 2601 offers:

- A more reliable I.C. chip test probing method
- Tighter tolerances
- Long life . . . excellent wear properties
- Cash value when returned as precious scrap and . . .
- Famous Ney Paliney® 7 precious alloy reliability

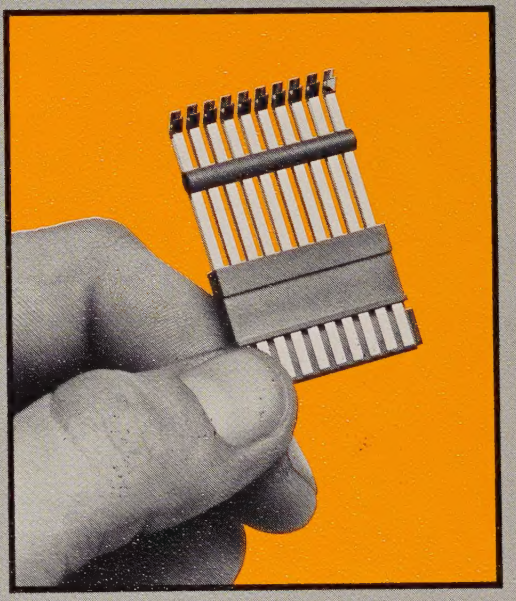
TYPE NO.	"A" DIA.	∅	L
2601-10	.010	4°30′	.438
2601-11	.011		
2601-12	.012		
2601-13	.013	4°30′	.438
2601-14	.014		
2601-15	.015		

THE J. M. NEY COMPANY,
ELECTRONICS DIVISION
Bloomfield, CT 06002—(203) 242-2281

C1078-10A 1/83 Printed in USA

NEY PALINEY®

10 station noble metal contacts for dual-in-line testing



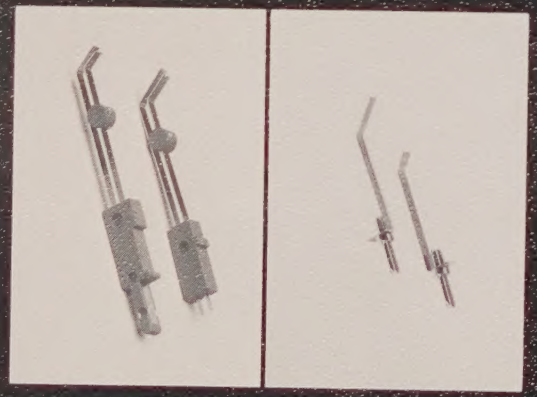
NEY

Precious Touch Test

PALINEY® 7

solid noble metal contacts

10 STATION dual-in-line test contact Ney std. 2010



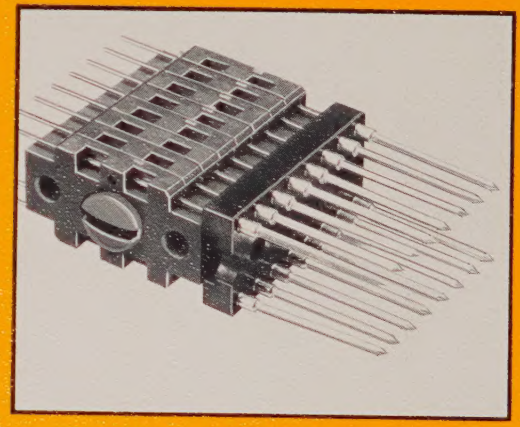
Ney Standard Single Station Test Contacts 2001 and 2000

Ney Standard Pin Contacts 2034 and 2033

Precision plastic molding

ALSO AVAILABLE . . .

modular noble metal burn-in test probes



Ney Types 2300 and 2600

Features

• Solid noble metal contacts • Simulates size and shape of dual-in-line package leads • Simultaneously checks both contact condition and continuity through PC board • Modular design for easy repair and replacement • Available in 300 and 600 mil centers (any pin count).

MP MASTER
MA33450